



# Steering interest rates in monetary policy – how does it work?

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*The purpose of this article is to describe the fundamental requirements to enable central banks in modern economies to be able to steer interest rates, as well as to describe and discuss the design and application of the Riksbank's monetary policy framework. The Riksbank's framework is compared with the main features of the American framework – a framework that was originally designed to provide an opportunity to directly control the quantity of money, but which is currently used only to control the overnight interest rate.*

## Introduction

According to the simplest textbook model, the inflation rate is determined by the amount of money in the economy and a monopoly on issuing banknotes in this model gives the central bank the opportunity to determine the inflation rate. However, the view of the role of the the quantity of money in enabling monetary policy to influence inflation has changed as the payments system has developed. Today almost all central banks apply interest rate steering without any direct aim to implement narrow measures for the quantity of money.

We conclude in this article that on the well-developed financial markets in which central banks are now active, the issuing of banknotes and coins is not an evident condition for being able to steer interest rates. Nor is it necessary to apply a reserve requirement. Our conclusion is that the right to determine the terms for deposits and lending in the central bank for the banks taking part in the central payments system comprises a sufficiently strong condition for being able to influence the setting of interest rates on the overnight market. The overnight interest rate in turn affects price developments in the economy via many different channels.

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Following a review of the basic conditions for modern central banks' possibilities to influence interest rate formation and thus inflation, there is a comparison of the Riksbank's monetary policy framework with the main elements of the American framework. This is an example of a framework that was originally designed to provide control over the quantity of money, but which is currently used solely to steer the overnight interest rate. In conclusion, we describe how the Riksbank acts in practice to steer the interest rate and we discuss the considerations that have formed a basis for parts of the design and application of the Riksbank's monetary policy framework.

## Inflation rate steering shown in a simple model

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**In the simple textbook version, prices are determined by the quantity of money in the economy.**

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of money in the economy. Banknotes are the only means of payment – the amount of banknotes thus comprises the quantity of money – and the central bank has a monopoly on issuing banknotes. However, with a given production of goods, prices rise if the quantity of banknotes in circulation increases, and vice versa, which means that the central bank can determine the inflation rate by determining the amount of banknotes.

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**If there is also a bond market, the central bank can control the quantity of money and thus prices, through steering interest rates or alternatively by governing supply or quantity.**

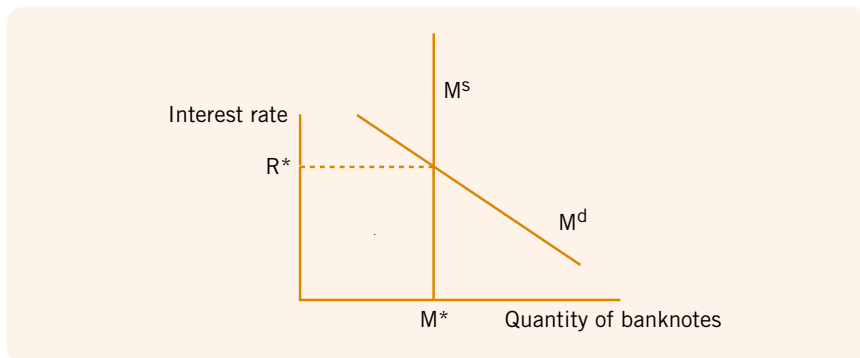
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If the model is expanded to include a bond market, the demand from the general public for banknotes will be sensitive to interest rates, as the holding of banknotes will not provide any yield and as there is always an opportunity to choose between having one's financial assets invested in bonds or banknotes. The nominal interest rate will therefore comprise the alternative cost for holding banknotes. The central bank is able, in this model, to control the quantity of money and thus prices by determining the interest rate so that the demand for banknotes is adapted to what is required for prices to develop in line with the central banks' objective, known as *steering interest rates*. Alternatively, the central bank can issue a certain amount of

<sup>1</sup> See for instance Dornbusch & Fischer (1994). The quantitative theory:  $m^* = y + p^* - v$  shows a demand function for money in logarithm form of  $M/P = L(Y, i)$  where  $M$  is the quantity of money,  $Y$  is the real GDP,  $i$  is the interest rate and  $V = Y/(M/P)$  is the circulation speed. The equation shows that the demand for the quantity of money grows at the same rate as the inflation rate plus growth in real GDP and the change in the rate of circulation of money.



**Figure 1. Alternative methods of steering the quantity of money**



The inflation target can be achieved either by the central bank setting the interest rate at  $R^*$  or by the supply of money ( $M^s$ ) being set at  $M^*$ . If the central bank's inflation target is  $p^*$  and the rate of velocity of circulation for money is constant, then according to the quantitative theory (see note 1), the change in the quantity of money corresponding to the inflation target plus the change in the total production will bring about target fulfilment.  $M^d$  = the demand for money.

banknotes and allow the interest rate to be adapted so that the general public is willing to hold these banknotes, known as *supply* or *quantity steering* (see Figure 1).

## Changed conditions

Today the central banks operate in deregulated, well-developed financial markets. The conditions for pursuing monetary policy here are rather different from those in the simple textbook model.

In the simple model, the quantity of money consists merely of banknotes and coins. The central bank has the monopoly on issuing banknotes and thereby control over the quantity of money. Households' motivation for holding money is to be able to make payments. Finally, in the simplest model it is the role of the interest rate as an alternative cost for money which means that a change in the interest rate has an effect on the demand for money and thereby on inflation.

One important difference from the simple model is that *banknotes are not the sole means of payment* and have not been for a long time. Payments between accounts constitute an increasingly large percentage of the payment

flows and the payments system is developing rapidly. The balance on deposit accounts at banks can thus serve as a liquidity buffer for future transactions and thus be counted as money.

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**One important difference from the simple model is that *banknotes are not the sole means of payment* and *have not been so for a long time.***

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When banknotes ceased to be the only means of payment, the central banks' opportunities to use control of the supply of notes alone to influence the quantity of money, and thereby prices in the economy, were reduced. Most of the central banks introduced reserve requirements for the banks' liquid deposits in order to increase the control over the broader concept of money. The reserve requirements forced the banks to invest some of their deposits from the general public in non-interest bearing accounts in the central bank. This meant that the *monetary base*, defined as notes and coins in circulation plus the banks' non-interest bearing deposits in the central bank, was in principle controlled in the same way as the quantity of notes and coins in the simplest model. The reserve requirement design meant that the monetary base could under certain assumptions have a fixed relation to the quantity of money. The central bank was therefore assumed able to control the expanded quantity of money by controlling the monetary base. On condition that the quantity of money and prices showed a stable connection, the central bank could also affect prices.

However, liquid securities markets, properly functioning overnight markets and effective payment systems have *reduced the need to maintain liquid funds* in the form of deposits and banknotes as a *buffer* to be able to execute transactions. Securities can be rapidly sold or pledged, for instance, and credit undertakings can be rapidly transformed into means of payment by creditworthy banks. The rapid rate of development has made it difficult to find a measure for the concept of money that shows a stable connection with the inflation rate.

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**As it has become more difficult to define what should be termed as money, it has also become more difficult to determine what is the alternative cost for investing part of one's financial assets in money.**

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The simplest textbook model also assumes that a *holding of money* does not provide any yield. One motive for introducing the reserve requirement without any interest compensation was to increase the alternative cost for holding money in the extended sense, as the banks reduced their interest compensation on

the general public's deposits because of the reserve requirement and thereby increased the sensitivity of the demand for money. However, as it has become more difficult to define what should be termed as money, it has also become *more difficult to determine what is the alternative cost* for investing part of one's financial assets in money.

Knowledge of the mechanisms that enable monetary policy to influence inflation – known as the *transmission mechanism* – is limited. Nevertheless, it is clear that it is much more complicated<sup>2</sup> than in the simple model where the role of the

<sup>2</sup> See for example Friedman (1999).



interest rate as an alternative cost for money comprised the only channel by which the interest rate could affect inflation. It now appears unlikely that this particular channel plays an important role. Slow-moving prices probably mean that nominal interest rate changes via several different channels affect the demand for goods, services and financial assets, which is reflected in the demand for credit and means of transactions.

To summarise, technological developments, deregulation and internationalisation have all made it more difficult to utilise the quantity of money as an intermediate goal towards a final price stability goal.

Today, most central banks therefore aim their monetary policy towards influencing interest rate formation in the economy via the overnight interest rate (see later section) without directly aiming its effects at the quantity of money. The quantity of money is now mainly used as *one inflationary indicator* among many others by most central banks. However, there are considerable differences in the way the central banks assess the quantity of money as an inflationary indicator. The European Central Bank, ECB,<sup>3</sup> for instance, gives a ‘reference value’ for the growth in the quantity of money considered compatible with their price stability target in the medium term, but at the same time has stated quite clearly that the quantity of money is *not* used as an *intermediate target* towards the final price stability target.

## Payment system and overnight market are important for steering interest rates

In modern economies the central banks thus aim to use steering interest rates to directly influence their final targets for monetary policy. Interest rate formation in the economy is influenced by steering of the interest rate at

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which the banks can finance the deficit or invest the surplus in their payment flows overnight, i.e. the overnight interest rate. The fact that the central bank can influence the interest rate on the overnight market is mainly due to its ability to determine the terms for and scope of deposits and lending in the central bank overnight for the banks participating in *the central payments system*. This system is used to process payments between the central bank and the banking system, and between the banks participating in the system. Examples of two different mone-

<sup>3</sup> See ECB (1999).

etary policy framework, where the conditions for deposits and lending in the central bank differ in an interesting way, will be provided in a later section.

On well-developed financial markets most of the deficits and surpluses arising in the payment flows during the day are evened out when the banks lend from and invest in one another on the overnight market. The terms applied for loans and deposits in the central bank are usually set so that it is more advantageous to use the *overnight market* to even out deficits and surpluses in the payment flows than to borrow and make deposits in the central bank while there is sufficient liquidity on the overnight market.

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**By influencing the current and expected overnight interest rate, the central bank can also influence the interest rates for the general public.**

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The overnight interest rate is the shortest market interest rate. As the overnight interest rate normally comprises the alternative cost or yield for a bank's financing or investment, it affects the interest rates set throughout the

economy. A bank that grants loans to a company can in principle finance this by borrowing on the overnight market. A bank that has a surplus to invest can choose between lending out the money on the overnight market to another bank, buying interest-bearing securities or granting longer term loans to the general public. Expectations of the development of the overnight interest rate during the remaining term of security will thereby affect how much the bank is willing to pay for the interest-bearing security, which is directly reflected in the interest rate. The expectations of the overnight interest rate during the period that a lending rate is fixed will also comprise the basis for the lending rate offered to the general public. By influencing the current and expected overnight interest rates, the central bank can also influence the interest rates for the general public.

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**A deficit in a bank's payment flows must be financed in the short term through loans on the overnight market or through borrowing, alternatively by reducing its deposits in the central bank.**

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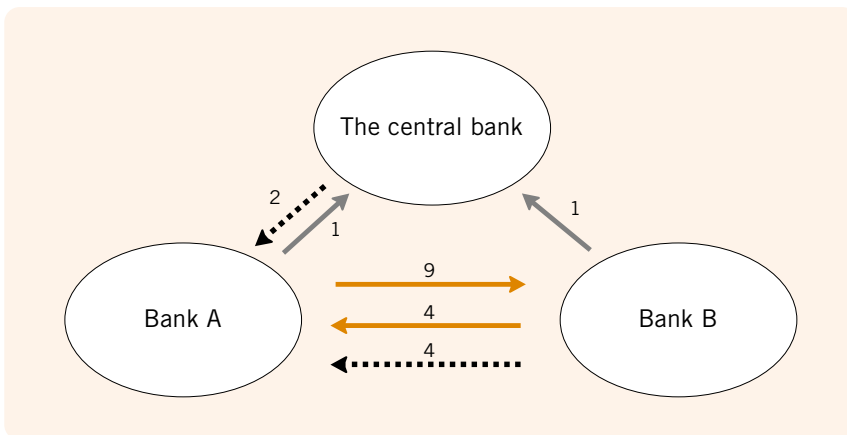
A deficit in a bank's payment flows can arise, for instance, if the bank executes large payments from its customers' deposit accounts to other banks. The deficit must be financed in some way.<sup>4</sup> In the longer term, the bank can reduce its lending, but as these loans cannot be cancelled immediately, the short term

financing has to be done through loans on the overnight market or by borrowing, or reducing deposits at the central bank. Similarly, a bank with a surplus in its payments has to invest this in the short term either in the overnight market or in

<sup>4</sup> Deficits in payments arise during the day and can remain at the end of the day. Here we discuss financing of deficits at the end of the day. Deficits during the day can either be financed through intraday credit at the central bank or by the participants maintaining a liquidity buffer in their deposit account at the central bank.



**Figure 2. Payment flows and liquidity positions**



	Payments		Liquidity position after client payments and deliveries of notes	Payments		Liquidity position after overnight trading and the central bank's market operations
Bank A:	- 9	+ 4 - 1	= - 6	+ 4	+ 2	= <b>0</b>
Bank B:	+ 9	- 4 - 1	= + 4	- 4		= <b>0</b>
Central bank:	+ 2		= + 2	- 2		= <b>0</b>
			<b>0</b>			<b>0</b>

Note. The example illustrates how payments between participants in the central payments system generate liquidity surpluses and deficits among participating banks and how the liquidity positions are evened out on the overnight market, where the central bank also operates. In the example, Bank A initially has a deficit (-6) after payments to and from Bank B on behalf of clients as well as payments to the central bank for banknotes. Bank A has to finance this either through the overnight market or in the central bank. Meanwhile, Bank B has a surplus (4) that needs to be deposited. The banking system as a whole initially has a deficit in the central bank (-2), which in the example is reported as the central bank having a surplus that must be invested. Bank B chooses to lend its liquidity surplus (4) to Bank A (the alternative would have been to deposit the surplus in the central bank). At the end of the day, the central bank can choose to allow Bank A to borrow overnight or to reduce its deposit in the central bank. Alternatively, the central bank can choose to buy securities on the overnight market to supply liquidity. In the example the central bank has chosen to buy securities and pays (2) to Bank A, which sells securities to obtain liquidity. The terms for deposits and lending in the central bank and the central bank's capacity to influence the banks' total liquidity through market operations will determine the interest rate on the overnight market.

the central bank at the terms decided by the central bank. The conditions for financing directly in the central bank are that the bank participates in the payments system where payments between the banking system and the central bank are implemented.

The banks taking part in the central payments system can have a total surplus

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**At the end of each day's payments, the banks participating in the central payments system can have a total surplus or deficit that requires depositing or borrowing in the central bank.**

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purchase and sale of securities are examples of what generates payments between the banks and the central bank. A deficit in the banking system's payments to the central bank is usually described as the banking system having a *liquidity deficit*. The banks must then finance this at the terms decided by the central bank, either through borrowing from the central bank if the system so allows, or by reducing the amount in their accounts at the central bank. The central bank can thus *influence the liquidity of the banking system* through its purchases and sales.

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**The terms for deposits and lending in the central bank and the way the central bank chooses to influence the liquidity situation in the banking system comprise the core of all monetary policy control systems.**

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The terms for deposits and lending in the central bank and the way the central bank chooses to influence the liquidity situation in the banking system comprise the core of all monetary policy frameworks. The issuing of banknotes creates a basic need for the banks to borrow from the central bank, but does not comprise a condition for being able to steer interest rates. If the central bank wishes the banks to have a borrowing requirement, this can be created by, for instance, issuing its own securities. There are thus many similarities between the monetary policy frameworks applied by different central banks.<sup>5</sup> However, although there are considerable fundamental similarities between the various monetary policy frameworks, there are also important differences. We will compare below two types of system – one based in principle on the same mechanisms applied by the American central bank and one with the same characteristics as the Riksbank's system.

or deficit at the end of each day's payments that requires depositing or borrowing in the central bank (see Figure 2). Deficits or surpluses arise if the payment flows between the banking system and the central bank have not been balanced during the day. Receipt and supply of banknotes and the central bank's

## A monetary policy frameworks with non-interest bearing reserves

The American central bank's monetary policy framework is based on the fact that the banks have a need to invest some of their assets in deposit accounts at the central bank and that this account has no earnings. The banks' need to invest

<sup>5</sup> See Borio (1997).





some of their assets in the Federal Reserve is created by a binding reserve requirement. The system is also based on the banks only being able to borrow from the central bank in exceptional cases. Although the American system provides scope for the banks to borrow in a *discount window* at an interest rate normally lower than the market rate, frequent borrowing from the central bank indicates that the bank has problems financing itself on the market.

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**The banks' needs to invest some of their assets in the Federal Reserve are partly created by a binding reserve requirement and partly by the fact that the lending facilities in the central bank are limited in practice.**

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If the costs – the purely pecuniary or those arising as the results of an element of punishment on utilisation – for borrowing from the central bank are high, the banks can choose to place funds in the central bank in addition to the reserve requirement (known as free reserves) in order to have a liquidity buffer, despite the lack of earnings on deposits. There is otherwise a risk that the bank will have a deficit in its current payments at the end of the day that cannot be financed on the overnight market and cannot be financed in the central bank without high costs. The amount an individual bank chooses to place in the central bank in addition to the reserve requirement depends partly on the anticipated fluctuations in the payment flows. This is affected by, for instance, the bank's balance sheet total, where credit stocks and deposits by the general public comprise an important part. As the demand for credit from the general public and bank deposits are affected by the interest rate situation, the bank's need to place funds in the central bank is indirectly affected by changes in the interest rate, both because of the reserve requirement and because of the need for free reserves. The demand for free reserves is also affected directly by the overnight interest rate, as investments on the overnight market comprise an alternative to placing funds in the central bank, but it is also influenced by the cost of borrowing in discount windows.

The mechanisms that entail the central bank being able to influence the overnight interest rate in this system can be described as follows:

The central bank can influence the banks' balance on their deposit accounts in the central bank by buying or selling securities. If the central bank wants to lower the interest rate, it buys securities from the market to at the interest rate offered in the market (compare with the description of supply control in the simple model). This is often described as providing the market with liquidity via open market operations. When the central bank buys securities, this is done through banks with accounts in the central bank. The payments for these se-

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**By buying or selling securities, the central bank can influence the banking system's balance on their deposit accounts in the central bank.**

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**Figure 3. The central bank lowers the interest rate**

Banks				The central bank											
Assets		$t_1$	$t_2$	Liabilities		$t_1$	$t_2$	Assets		$t_1$	$t_2$	Liabilities		$t_1$	$t_2$
Liquid assets in the central bank		+		Deposits from the general public			+	Securities	+	+		Banknotes			+
Lending			+									Deposits from banks		+	
Securities		-	+												

The general public							
Assets		$t_1$	$t_2$	Liabilities		$t_1$	$t_2$
Banknotes			+	Securities			+
Deposits in banks			+	Loans from banks			+

Note. In the example the central bank buys in period 1 ( $t_1$ ) securities and pays for them by crediting the banks' deposit accounts in the central bank. The total of the banks' assets changes when their securities holdings decline at the same time as the deposits in the central bank increase. This means that the yield on the banks' assets also declines. Initially the banking system does not need very large deposits in the central bank. The banking system in total cannot influence deposits in the central bank, but each individual bank can increase its yield by reducing its balance at the central bank and instead offering the money on the overnight market. This pushes down interest rates on the overnight market. The lending rate to the general public also falls and the demand for credit rises. Lower interest rates have led in period 2 ( $t_2$ ) to an increase in the general public's loans in the banks and on the securities market, while their deposits and holdings of banknotes have risen. In the banks' balance sheets, the securities holdings, lending and deposits have risen. The interest rates stabilise when they have fallen so much that the banks are satisfied with retaining the deposit in the central bank that the central bank wishes to offer.

curities are credited to the banks' deposit accounts in the central bank. The banks' total balance on their deposit accounts at the central bank will thus be higher than they initially require. This leads to an individual bank that feels it has an excessively large deposit in the central bank offering liquidity on the overnight market. The overnight interest rate falls when the supply of liquidity increases. A lower interest rate leads to both a decline in the alternative cost of having a deposit in the central bank and to the banks' balance increasing as a result of growing demand for credit and a rise in the demand for means of transaction. The banks' need to invest funds in the deposit account at the central bank thereby increases. The overnight interest rate stabilises when the banks as a whole demand the liquid deposits in the central bank that the central bank has offered through market operations.

The central bank can signal the level it wishes for the overnight interest rate in order to ensure the overnight interest rate stabilises at the level aimed for in its monetary policy. The Federal Reserve does this by announcing a Fed funds target. Frequent adjustments in the banking system's total liquid deposits in the central bank via open market operations can further stabilise the overnight interest rate.

The description of how this system functions has been based on the mechanisms that affect the overnight interest rate. In this system, the overnight interest rate



is affected by how much the banks as a whole are forced to invest in the central bank via the central bank's open market operations, i.e. how much liquidity the central bank is offer-

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**In this system the overnight interest rate is affected by how much liquidity the central bank offers.**

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ing. One alternative would therefore be to describe the system according to its capacity to influence the quantity of money. The way this system is designed enables the central bank to quantify and steer towards a target for the 'monetary base', which includes the banks' balance on their deposit accounts in the central bank as well as banknotes. As we concluded earlier, however, interest rate changes have an effect on inflation via many different channels, at the same time as the general public's need to maintain a liquidity buffer in the form of notes and coins changes as the system of payments develops. Having a special target for the development of the monetary base has therefore proved to be an ineffective method of steering inflation.

## A monetary policy frameworks with deposit and lending facilities and no reserve requirement


Many central banks that have changed their monetary policy frameworks in recent years have changed to a system with no reserve requirement, or to a system where the reserve requirement provides full compensation for interest, and with deposit and lending

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**In the Riksbank's system, a bank with a deficit in its payment flows at the end of the day has the right to finance this overnight in the central bank at the lending rate.**

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facilities where the interest rate terms limit the overnight interest rate. The Riksbank, which introduced a new monetary policy framework in 1994 – steering interest rates – belongs to this group. One important reason for avoiding monetary policy frameworks based on banks placing funds in the central bank at a low interest rate, or none at all, has been the costs incurred by the banks when they are forced to place some of their assets in the central bank at terms inferior to those on the market. Nor has it been considered necessary to use the design of the monetary policy framework to increase the scope for steering a broader definition of the quantity of money (see earlier section). In the Riksbank's system, a bank that has a deficit in its payment flows at the end of the day has the right to finance this overnight in the central bank at the lending rate. In contrast to the terms applying for loans in discount windows in the American monetary policy framework, the lending facilities can be utilised without limitation as long as the banks can present eligible assets as collateral and the need to borrow does not give any negative signal with regard to the bank's financial situation. In the same



way, a bank with a surplus can deposit this in the central bank at the deposit rate. The deposit and lending rates will thus always set the limits for the overnight interest rate, as they comprise an alternative to the overnight interest rate.

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**The Riksbank aims to steer the overnight interest rate so that it lies midway between the deposit and lending rates and marks the level for these by announcing the repo rate.**

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operations at the Riksbank's repo rate will limit the utilisation of the deposit and lending facilities, while the overnight interest rate will lie close to the repo rate. The fact that the difference between the deposit and lending rates is kept sufficiently large for the banks to have motivation to firstly even out deficits and surpluses in their payment flows on the overnight market also contributes to the facilities<sup>6</sup> being seldom used. As the Riksbank has stated that its intention is normally to supply sufficient liquidity that the deposit and lending facilities will not need to be utilised and as the liquidity adjustment operations<sup>7</sup> are executed at the Riksbank's repo rate, the overnight interest rate stabilises close to the repo rate.

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**The system applied by the Riksbank was constructed solely to influence the overnight interest rate through steering interest rates.**

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The system applied by the Riksbank was constructed solely to influence the overnight interest rate through steering interest rates. The deposit and lending rates will therefore set the limits for the overnight interest rate, regardless of how much liquidity the Riksbank provides. If the Riksbank buys so many securities that the banking system has a liquidity surplus, the banks will have to utilise the deposit facility and the overnight interest rate will correspond to the deposit rate. As long as the overnight interest rate is higher than the deposit rate, there is motivation for those banks forced to place some of their assets in deposit accounts in the central bank to lend money on the overnight market, but when the interest rate differences cease to exist, there is no longer any such motivation.

The Riksbank aims to steer the overnight interest rate so that it lies midway between the deposit and lending rates and signals the level for these by announcing the repo rate. Meeting the banking system's total requirement to borrow or deposit liquidity via open market

The system applied by the Riksbank was constructed solely to influence the overnight interest rate through steering interest rates. The deposit and lending rates will therefore set the limits for the overnight interest rate, regardless

<sup>6</sup> The Riksbank offers interest-free intraday credit, which means that the banks do not need to have funds deposited with the central bank to meet payment deficits during the day.

<sup>7</sup> There is 'fine tuning' of interest rates that deviate from the repo rate by 10 interest points. See coming sections.



## The Riksbank's steering of the overnight interest rate in practice

This section contains an in-depth description of the Riksbank's monetary policy framework and how the Riksbank works in practice to steer the market interest rates. We concluded earlier that an important part of the monetary policy framework is the banks' right to overnight loans and deposits in the Riksbank at predetermined interest rates, the lending and deposit rates. Other important elements of the Riksbank's framework include the stated intention to steer the liquidity position of the banking system via market operations so that the overnight interest rate stabilises close to the repo rate.

The deposit and lending rates form an interest corridor for the market's overnight interest rate. The difference between the deposit and lending rates currently amounts to 150 basis points. This creates an incentive for the banks to even out deficits and surpluses in liquidity between one another.

The Executive Board of the Riksbank determines the repo rate at its monetary policy meetings, which are held six to eight times a year. The repo rate decision provides signals where the Riksbank wishes the overnight interest rate to be. The largest liquidity adjusting market operation in terms of quantity takes place once a week when the Riksbank announces its monetary policy repo<sup>8</sup> or the issue of certificates. As long as the span of the corridor does not change, the repo rate also determines the lending and deposit rates, as the repo rate shall now always lie at the centre of the corridor.

All lending<sup>9</sup> in the lending facility as well as provision of liquidity via monetary policy repos is done against collateral. The securities accepted are interest-bearing securities issued primarily by the Swedish central government or by Swedish mortgage institutes.<sup>10</sup>

The implementation of repos, as mentioned above, is one of the Riksbank's open market operations. Other examples of open market operations that can be used to influence liquidity are the issuing of Riksbank certificates and foreign exchange swaps<sup>11</sup>. Issues of certificates are used to make rough adjustments to liq-

<sup>8</sup> Monetary policy repos involve the Riksbank buying securities and supplying liquidity. After one week the Riksbank sells back the securities and receives liquidity. The term monetary policy repo is termed main refinancing operations on the Riksbank's balance sheet.

<sup>9</sup> This also applies to the 'non-interest bearing' intraday credit given by the Riksbank to participants in the RIX payments system.

<sup>10</sup> The Riksbank can, when granting emergency liquidity assistance, also accept lending under other terms than the normal ones (see the Sveriges Riksbank Act 1988:1385).

<sup>11</sup> Foreign exchange swap (FX-swap) here refers to transactions where the Riksbank buys (sells) currency for kronor spot then sell (buy) back the currency for kronor in a forward agreement. When the Riksbank buys currency, liquidity is conveyed to the krona market, i.e. the transactions have the same effect on liquidity in krona as a monetary policy repo.

uidity when there is a 'structural liquidity surplus' in the banking system, i.e. when liquidity normally needs to be absorbed from the banking system.

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**The Riksbank's practical steering of the overnight interest rate can be described in three stages.**

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The Riksbank's steering of the overnight interest rate can be described in three stages. Stage 1 involves a forecast of the size of the open market operations to be implemented during the coming week, that is to say, how much liquidity needs to be supplied or absorbed for the banks to be able to avoid using the deposit and lending facilities during the coming week. Stage 2 involves supplying or absorbing the liquidity through an open market operation. Stage 3 involves executing open market operations to parry the daily fluctuations in the banking system's current payments so the banking system will not need to utilise the facilities.

### STAGE 1. FORECAST OF THE SIZE OF THE WEEKLY OPEN MARKET OPERATIONS

The decision on how much liquidity that will need to be supplied or absorbed over the coming week is based on a forecast of the payments or flows between the Riksbank and the banks and will influence the items included in the Riksbank's balance sheet.

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**The Riksbank's assets consist of its gold and foreign reserve assets, a domestic securities portfolio and lending to the banks.**

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*The Riksbank's assets* consist of its gold and foreign reserve assets, a domestic securities portfolio and lending to the banks. The gold and foreign reserves consist of, in addition to gold, securities denominated in foreign currency and claims on the IMF. The domestic securities consist solely of securities issued in kronor by the Swedish central government.<sup>12</sup> Lending to the banking system currently comprises a significant part of the Riksbank's assets. It consists almost exclusively of lending to the banking system through monetary policy repos.

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**The Riksbank's liabilities consist mainly of banknotes and coin, as well as capital and reserves and equity capital.**

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*The Riksbank's liabilities* consist mainly of banknotes and coins, as well as capital and reserves. Other items on the liabilities side include deposits from banks (the deposit facility), which are normally on a small scale. Capital and reserves are a part of the Swedish central government's assets (see Figure 4).

Every Tuesday the Riksbank makes a forecast of how large the surplus or

<sup>12</sup> The domestic securities portfolio was used previously to intervene on the Swedish money and bond market with the aim of influencing various terms on the yield curve. The portfolio has also been used to support the growing Swedish repo market. As the functioning of the interest rate market improves, the monetary policy need for a domestic securities portfolio has declined.

**Figure 4. The Riksbank's balance sheet as at 31 December 2000**

<b>Assets</b>	<b>SEK million</b>	<b>Liabilities</b>	<b>SEK million</b>
Gold and foreign reserve assets (net)	159 444	Banknotes and coins in circulation	97 663
Refinancing transactions (monetary policy repos and fine tuning operations)	43 156	Deposit facility	108
Lending facility	48	Other liabilities	1 391
Domestic securities	20 728	Reserves	42 193
Other assets	1 276	Capital	62 988
Total	224 652	Result for the year	20 309
		Total	224 652

Note. Assets and liabilities in foreign currencies are reported net.

deficit in the banking system's payments to and from the Riksbank will be on average during the coming week. The banking system's surpluses and deficits are always reflected in changes in the Riksbank's balance sheet. If the general public increases its demand for banknotes, this occurs through the banks. When the banks order banknotes, a liquidity deficit arises that has to be financed through the Riksbank. The liquidity forecast is therefore based on expected changes in the various items on the balance sheet. The total of the forecast changes will provide information on the size of the monetary policy repo (or where appropriate the issue of certificates).

The items on the asset side are relatively simple to forecast, as the changes are normally initiated by the Riksbank.<sup>13</sup> Changes in the gold and foreign reserves assets arise when the Riksbank buys and sells currency on the market on behalf of the central government. The Riksbank functions as the central government's bank with regard to foreign exchange. Changes as a result of interventions on the currency market can also occur, but are rare.<sup>14</sup> Changes in the securities portfolio denominated in kronor arise when coupons mature and when securities fall due for final payment. Changes in this item could also occur when new securities are purchased on the secondary market, but this does not normally happen.

On the liabilities side, it is normally only changes in the amount of banknotes and coins in circulation that need to be forecast. Increases or decreases in this item are initiated by the general public and therefore cannot, at least in the short term, be controlled by the Riksbank. The general public's demand for banknotes and coins shows a clear and stable seasonal pattern. The demand increases considerably before major holidays, such as Christmas, but also the weekends directly after the monthly payday. This item is therefore fairly easy to forecast.<sup>15</sup> Other items on

<sup>13</sup> The central government has not had overnight borrowing rights in the Riksbank since the middle of 1994. The central government's own liquidity management is done through accounts in the commercial banks.

<sup>14</sup> The reserve can also increase as a result of interest income from the reserve. However, there is no effect on the krona liquidity in the banking system.

<sup>15</sup> The complexity of the forecast work increases if the banknotes' sensitivity to repo rate changes is taken into account. However, the Riksbank disregards the interest sensitivity of the forecast work and only takes into account the seasonal pattern. The reason for this is that the Riksbank implements daily fine tuning, which requires less precision than the weekly forecasts.

both the asset side and the liabilities side show only very minor and predictable changes, for instance payments to the central government in connection with the allocation of the net revenue. This happens once a year.

When all of the changes to the various items have been forecast and totalled, the Riksbank can see how much liquidity needs to be supplied or drawn in from the banking system.

As we have previously stated on a number of occasions, the banks can have a 'structural' liquidity deficit or liquidity surplus towards the central bank. The liquidity deficit in the Swedish banking system amounted to just over SEK 43 billion on 31 December 2000 and therefore also determined the size of the monetary policy repo. Figure 5 shows how the various items contributed to this liquidity deficit.

**Figure 5. Calculation of the banking system's structural liquidity position as at 31 December 2000**

	SEK billion
Banknotes and coins in circulation	98
Deposit facility	0
Other liabilities	1
Capital and reserves	105
Result for the year	20
Gold and foreign reserve assets (net)	-159
Lending facility	0
Domestic securities	-21
Other assets	-1
<b>The banking system's liquidity position, as well as the size of the monetary policy repo or the size of the certificates issued</b>	<b>43</b>

Note. The figures are taken from the Riksbank's balance sheet as at 31 December 2000.

The table shows that there is currently liquidity deficit in the Swedish banking system. The Riksbank provides for this by lending to the banks via monetary policy repos. If the total had instead resulted in a negative figure, there would have been a liquidity surplus in the banking system, and the Riksbank would have issued certificates. This applied in the Swedish banking system from 1993 to spring 1997.

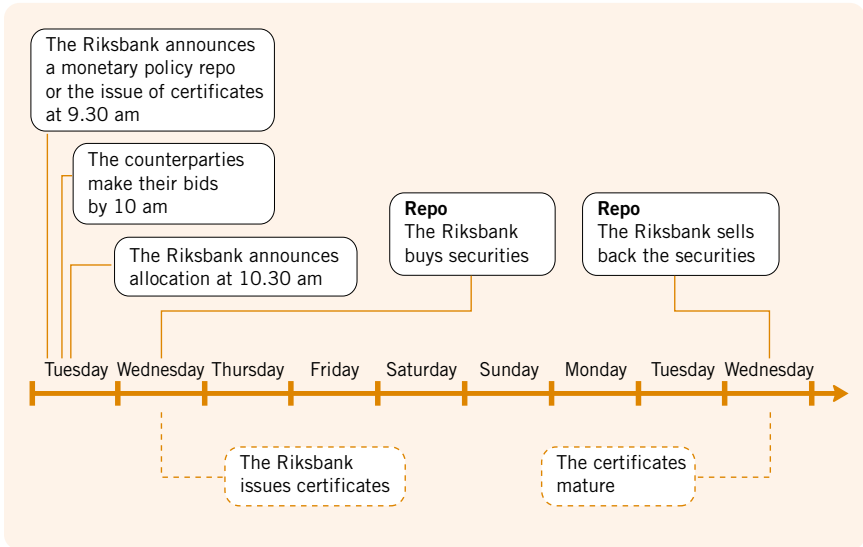
## STAGE 2. EXECUTION OF THE WEEKLY OPEN MARKET OPERATION

**After the forecasts have been made, the Riksbank executes an open market operation.**

After the forecasts have been made, the Riksbank executes an open market operation accordingly. This is done in the form of a monetary policy repo when there is a structural liquidity deficit in the banking system and in the form of issuing of certificates when there is a structural surplus. The announcement is made at 9.30 am every Tuesday informs the type of operation (monetary policy repo or issue of certificates), the duration, repo rate and the minimum and maximum bids.



**Figure 6. Timetable for the Riksbank's refinancing operations or issue of debt certificates**



The Riksbank applies an auction procedure at a fixed interest rate<sup>16</sup> that is to say the repo rate. The minimum a counterparty is allowed to bid is SEK 0.2 billion and the largest bid a counterparty can make is SEK 15 billion. The maturity is normally one week.

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**The Riksbank applies an auction procedure at a fixed interest rate, the repo rate.**

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It is the Riksbank's counterparties, known as primary dealers, who have the right to bid in the weekly open market operations.<sup>17</sup> The counterparties shall make their bids to the Riksbank before 10 am. Distribution is then according to an allocation percentage for the respective bank. This is calculated as the respective bank's share of the total bid quantity. If the bids made by the monetary policy counterparties fall below the intended allocation, the liquidity requirement is fine tuned according to the principle described in stage 3 below.

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**It is the Riksbank's counterparties, known as primary dealers, who have the right to bid in the weekly open market operations.**

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The result of the auction procedure is then announced to the market at 10.30 am and the banks receive the liquidity (or deposit liquidity) on the follow-

<sup>16</sup> The counterparties bid only the amount of liquidity they want to receive (or sell) at the pre-stated price. Alternatively, the operation can be executed at a variable rate. This means that the counterparties state in the bid both how much liquidity they want to receive (or sell) and at what price.

<sup>17</sup> There are currently seven institutes that are primary dealers on the interest rate market.

**The result of the monetary policy repo is announced at 10.30 am and the banks receive the liquidity (or deposit liquidity) on the following day.**

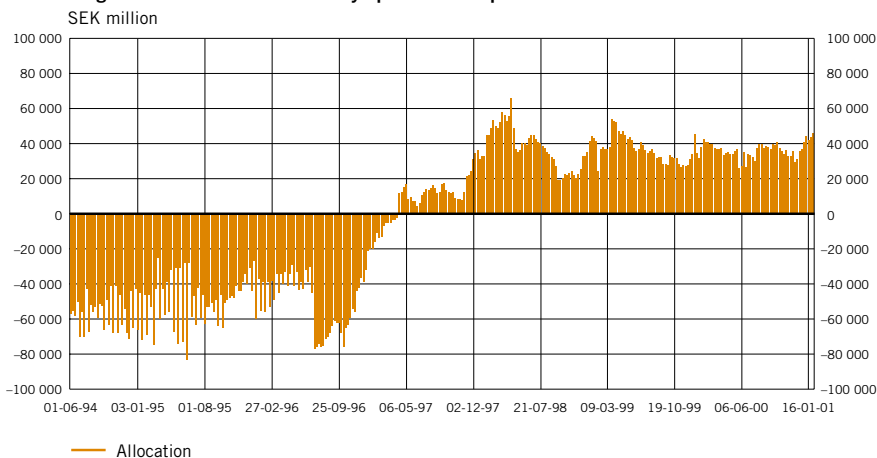
ing day, i.e. normally on Wednesdays when the previous week's operation falls due. Figure 6 shows the various stages in implementing a refinancing operation. The figure also shows the stages for issuing certificates.

During the period July 1994 to May 1997, the Riksbank issued certificates as the banking system then had a structural surplus of liquidity. Since then the banking system has had a structural deficit of liquidity (see Diagram 1).

### STAGE 3. THE CLOSING OF THE PAYMENTS SYSTEM AND STABILISATION OF THE OVERNIGHT INTEREST RATE

Every single day there are large flows of payments in kronor between the banks through the Riksbank's payments system, RIX.<sup>18</sup> Deficits or surpluses arise regularly between the participants in the payments system, both during the day and at the end of the day. Before the payments system closes, the Riksbank reads the position of the banking system as a whole from the settlement accounts. It may then see that the banking system as a whole has a liquidity surplus (requiring deposits in the Riksbank) or a liquidity deficit (borrowing requirement from the

**Diagram 1. The size of the weekly open market operation**



Note. During the period up to mid-April 1997, there was a structural liquidity surplus on the market, which was withdrawn with the issue of certificates. Since then there has been a structural liquidity deficit in the banking system.

Source: The Riksbank.

<sup>18</sup> Large payments in Swedish kronor are managed in RIX, which is the Riksbank's payments system. Each participant has an account in the Riksbank that is debited or credited when payments are executed. A bank sending a payment to another bank reduces the balance on its account when the payment is debited, while the bank receiving the payment increases the balance on its account.



Riksbank). The total requirement of the banking system can vary on any single day, mainly because the forecasts of the amount of liquidity needing to be supplied or drawn in from the banking system cover the average during a weekly period. However, there can also be mistakes in the forecasts.

The Riksbank adjusts the banks' position against the Riksbank daily to ensure that the banking system as a whole does not need to utilise the facilities and with the aim of stabilising the overnight interest rate close to the repo rate. The fine tuning is done at the repo rate plus 10 basis points if the banks require liquidity and minus 10 basis points if the banks need to deposit liquidity. The fact that the fine tuning is done at the repo rate  $\pm 10$  basis points is intended to create an incentive for the banking system as a whole to bid in the weekly open market operations.

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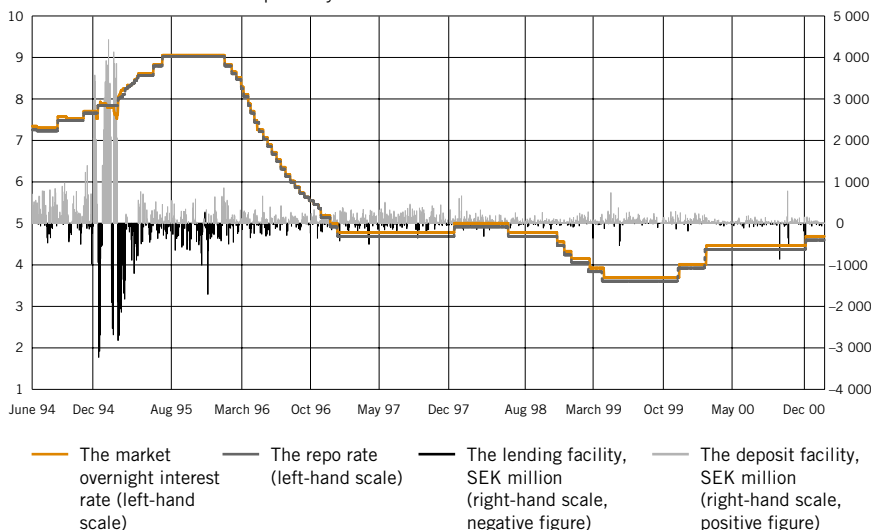
**The Riksbank adjusts the banks' position against the Riksbank daily to ensure that the banking system as a whole does not need to utilise the facilities and with the aim of stabilising the overnight interest rate close to the repo rate.**

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The use of the deposit facility and the lending facility respectively has during the period June 1994 until today, on average amounted to just over SEK 200 million (see Diagram 2). During the past two years, the use of the respective facilities has declined and only amounted to just over SEK 50 million on average, or 0.1 per cent of the structural deficit during these years. The volatility in the overnight

**Diagram 2. The Swedish overnight interest rate and the use of the facilities**

Per cent and SEK million respectively



Source: The Riksbank.



interest rate has been very low and it has followed the repo rate very closely. During a brief period at the end of 1994 and the beginning of 1995, no fine tuning was made, which increased the use of the facilities considerably and resulted in a more volatile overnight interest rate.

## Is the Riksbank's monetary policy framework expedient?

We have concluded in this article that most central banks in economies with well-developed financial markets aim to influence interest rates in the economy without taking any particular view of the direct effects on the quantity of money. The right to determine the terms for how the banks can invest or finance surpluses and deficits in their payments in the central bank at the end of the day, as well as the possibility to determine the banking system's total liquidity requirement through market operations, is what enables the central bank to control the overnight interest rate in practice.

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**The differences in the various central banks' framework often have a historical basis.**

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The terms for deposits and lending, the instruments used and the normal practice for the central bank's market operations to influence liquidity comprise the framework of the central bank's operational steering interest rates and have here been called the monetary policy framework. As we have shown, there are different ways of designing a monetary policy framework and we have in the article chosen to describe two main types. The differences in the various central banks' monetary policy framework often have a historical basis, however, and seldom reflect differences in assessments of which mechanisms work or what is effective in a broader sense.

In conclusion, we would like to report some of the considerations behind the concrete shaping of the Riksbank's monetary policy framework and to discuss briefly whether there are any good reasons for changing any part in the system. One central characteristic of a monetary policy framework is that it should be able to *steer the interest rate the central bank is aiming for*. For the system to be expedient without unnecessary market interventions, there are also other requirements. Here we merely emphasise some of them. The way that the central bank has chosen to steer the interest rate should not create any unnecessary costs for liquidity management in the economy. Furthermore, counterparties for monetary policy and participants in the payments system must be chosen so that the setting of interest rates functions effectively. Steering interest rates should not in themselves create unnecessary uncertainty over the development of the overnight interest



rate. Neither should the design of the system unnecessarily affect the allocation of savings between different instruments.

When the Riksbank's monetary policy framework was designed, there was an aim to avoid elements that had a nature of taxation, such as the reserve requirement without interest rate compensation. That is why a system that uses deposit and lending facilities for limiting the overnight interest rate was chosen. This system has come to be applied so that the overnight interest rate is steered to follow the Riksbank's repo rate very closely. Of course, it is probably the slightly lower interest rates and the interest rates encountered by the general public that are important for the impact of monetary policy on inflation. However, as we maintained in an earlier section, the expectations of the overnight interest rate influence the setting of interest rates throughout the entire economy. Fluctuations in the overnight interest rate probably do not constitute a problem as long as they do not create unnecessary uncertainty over interest rate developments in the slightly longer term. The Riksbank has chosen to stabilise the overnight interest rate in order to avoid the risk of uncertainty, and because the cost of maintaining the overnight interest rate stable around the repo rate is considered low.

Some parts of the Riksbank's monetary policy framework could be designed in a different way without having a negative effect on the dirigibility of the overnight interest rate. This applies, for instance, to the difference between the deposit and lending rates, the corridor width. A very narrow corridor would

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**Some parts of the Riksbank's monetary policy framework could be designed in a different way without having a negative effect on the dirigibility of the overnight interest rate.**

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probably be very effective in steering the overnight interest rate, but at the same time the Riksbank would take over much of the risk distribution that is currently done on the overnight market. It is uncertain how broad the corridor needs to be in order for the banks' first choice to be to even out imbalances on the overnight market, but it probably does not need to be as broad as it is now. As the Riksbank governs liquidity so that the banking system very rarely needs to utilise deposit and lending opportunities, the broad corridor will scarcely lead to any cost for the system as a whole.

Neither is the dirigibility of the overnight interest rate dependent on the Riksbank's implementation of a regularly recurring liquidity adjustment operation once a week through repos or the issue of certificates. Maturity and frequency were originally chosen because

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**The dirigibility of the overnight interest rate is not dependent on the Riksbank's implementation of liquidity adjustment operations of a certain maturity and frequency.**

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they wanted the opportunity to change the repo rate every week. Following the introduction of the new Sveriges Riksbank legislation at the beginning of 1999, the monetary policy decisions have been taken by the Riksbank's Executive Board. Decisions on changing the interest rate are taken at monetary policy meetings, which are normally held six to eight times a year. The repo period is therefore scarcely motivated by the need to change the interest rates every week. However, there are no obvious advantages to having longer durations and less frequent liquidity adjusting market operations. If one does not want to accept major fluctuations in the overnight interest rate, for instance, the fine tuning operations could become larger.

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**To summarise, we can conclude that the system applied by the Riksbank functions well.**

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To summarise, we can conclude that the system applied by the Riksbank functions well. However, even if there are currently no obvious and major inefficiencies, there are some areas which do not need to remain the same as they are now. The pace of change on the financial markets is high, however, which makes it important to assess the structure and application of the Riksbank's steering system on a regular basis.



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