



Danmarks
Nationalbank

Monetary Policy
in Denmark



MONETARY POLICY IN DENMARK

June 2003

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As a rule, Tables and Charts are based on data up to and including 2002.

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Contents

FOREWORD	11
Chapter 1: THE MONETARY- AND FOREIGN-EXCHANGE-POLICY INSTRUMENTS	13
1.1 Danmarks Nationalbank is banker to the banks	14
1.1.1 Monetary policy	15
1.1.2 Payment system	19
1.2 The fixed-exchange-rate policy	21
1.3 The monetary-policy instruments	27
1.3.1 Current-account deposits	28
1.3.2 Danmarks Nationalbank's market operations	32
1.3.3 Monetary- and foreign-exchange-policy counterparties	38
1.4 The monetary-policy instruments in Denmark compared to those of the Eurosystem	39
1.5 Danmarks Nationalbank's balance sheet	43
1.5.1 Net position vis-à-vis Danmarks Nationalbank	44
1.5.2 The government's account at Danmarks Nationalbank	46
1.5.3 The foreign-exchange reserve	50
1.5.4 The portfolio of domestic bonds	52
1.5.5 Banknotes and coins in circulation	53
1.6 Instruments and intervention in the foreign-exchange market	54
1.7 References	58
Appendix 1.A: Danmarks Nationalbank's role in settlement of payments in Danish kroner	60
Appendix 1.B: Information from Danmarks Nationalbank	63
Appendix 1.C: Pledging of collateral for monetary-policy loans	69

Chapter 2: THE MONEY AND FOREIGN-EXCHANGE MARKETS.....	71
2.1 The Danish money market	71
2.1.1 Products	72
2.1.2 Market structure	74
2.1.3 Trading volume	76
2.2 The foreign-exchange market	79
2.2.1 Products	80
2.2.2 Market structure	81
2.2.3 Trading volume	85
2.3 References	86
Chapter 3: MONETARY POLICY, FINANCIAL CONDITIONS AND THE REAL ECONOMY	87
3.1 Formation of interest and exchange rates	88
3.1.1 External influences on Danish interest rates	88
3.1.2 The banks' interest rates	89
3.1.3 Money-market interest rates and short-term bond yields	91
3.1.4 Long-term interest rates	91
3.1.5 The effective krone rate	93
3.2 Financing patterns of households and corporations.....	95
3.2.1 Households	95
3.2.2 Corporations	98
3.3 The impact of interest and exchange rates on the real economy	99
3.3.1 Real-capital investments	101
3.3.2 Private consumption	102
3.3.3 Foreign trade	103
3.4 Effects of interest and exchange-rate changes on GDP and consumer prices	105
3.4.1 The effects of isolated changes in Danish interest and exchange rates	106
3.4.2 The effects of a temporary increase in interest rates in the euro area and Denmark	107
3.5 References	110
Chapter 4: MONETARY-POLICY STRATEGIES	113
4.1 Objectives	114

4.2	Intermediate targets	118
4.2.1	Denmark and the fixed-exchange-rate policy	121
4.2.2	Intermediate targets of other countries	126
4.3	Instruments	130
4.3.1	Market orientation of monetary policy	133
4.3.2	Denmark	133
4.3.3	Other countries	134
4.4	From strategy to practice	135
4.4.1	Independence	135
4.4.2	Interaction with fiscal policy	137
4.4.3.	Openness and transparency	139
4.4.4	Credibility	141
4.5	References	143
	GLOSSARY	147

Charts

1.1	Danmarks Nationalbank's lending rate and the money-market interest rate	18
1.2	Danmarks Nationalbank's discount rate and the banks' average rates of interest for lending and deposits	18
1.3	Exchange rate of the krone vis-à-vis the euro	22
1.4	Spread between monetary-policy interest rates in Denmark and in the euro area	25
1.5	Intervention purchases of foreign exchange against kroner...	25
1.6	Danmarks Nationalbank's monetary-policy interest rates	28
1.7	Danmarks Nationalbank's current-account interest rate and the overnight interest rate in the money market	29
1.8	The net position of the monetary-policy counterparties vis-à-vis Danmarks Nationalbank	36
1.9	Monetary-policy interest rates in Denmark and the euro area	42
1.10	Change in net position and net purchase of foreign exchange	46
1.11	The balance of the central government's account at Danmarks Nationalbank, year-end	49
1.12	The central government's liquidity impact in 2002	49
1.13	The foreign-exchange reserve and the central government's foreign debt, year-end	52
1.14	Banknotes and coins in circulation, and private consumption	53
2.1	Average daily turnover in cash market products on the money market in 2002	78
2.2	Average daily turnover in interest-rate derivatives in April 2001	78
2.3	Average daily turnover in the Danish foreign-exchange market in April 2001	84
3.1	Lending rates of the ECB and Danmarks Nationalbank	88
3.2	Danish interest rates for various maturities	89
3.3	The discount rate and the banks' average deposit and lending rates	90
3.4	10-year government-bond yields in selected countries	92

3.5	10-year bond yields in Denmark and Germany	93
3.6	Effective krone rate and bilateral krone rates	94
3.7	Quarterly percentage changes in housing prices and quarterly changes in long-term bond yields	97
3.8	Correlation between Danish stock prices and long-term bond yield	98
3.9	Long-term bond yield and investment ratio	101
3.10	Cash prices, construction costs and housing investments	102
3.11	Wealth and consumption as a ratio of disposable income	103
3.12	Danish export market share and relative export price	104
3.13	Relative import price and import market share	105
3.14	Effect on GDP in constant prices	106
3.15	Effect on consumer prices	107
4.1	Bilateral exchange rate and relative prices between Denmark and Germany	122
4.2	Short-term and long-term interest rates in Denmark since 1813	124
4.3	Annual growth in consumer prices in Denmark and Germany	125
4.4	Government budget balance in Denmark	138

Tables

1.1	Main items of Danmarks Nationalbank's balance sheet, end-2002	43
1.2	Impact on Danmarks Nationalbank's balance sheet of sale of foreign exchange for kr. 1 billion	45
1.3	Impact on Danmarks Nationalbank's balance sheet of a central-government payroll disbursement of kr. 1 billion	45
1.4	Impact on Danmarks Nationalbank's balance sheet of a central-government loan in foreign exchange of kr. 1 billion	45
1.5	Impact on Danmarks Nationalbank's balance sheet of an increase in banknotes and coins in circulation by kr. 1 billion	54
1.A.1	Krone payments	60
1.B.a	Information published on a daily basis	64
1.B.b	Other regular information	65
1.C.1	Pledgeable assets in connection with Danmarks Nationalbank's monetary-policy loans	69
1.C.2	Margins and haircuts on provision of collateral for krone-denominated credit from Danmarks Nationalbank	70
3.1	Weights in Danmarks Nationalbank's effective krone-rate index	95
3.2	Borrowing by households from Danish banks and mortgage-credit institutes	96
3.3	Borrowing by the corporate sector from Danish banks and mortgage-credit institutes	99
3.4	Effects of a temporary interest-rate increase in the euro area and Denmark	108

Boxes

1.1	Creation of current-account liquidity	17
1.2	Monetary policy and settlement of payments	20
1.3	The European Exchange-Rate Mechanism (ERM II)	23
1.4	Danmarks Nationalbank's use of intervention and changes in interest rates	26
1.5	Technical volatility in the overnight interest rate	31
1.6	Regular weekly market operations	33
1.7	Extraordinary market operations	35
1.8	Use of the monetary-policy instruments in practice	37f
1.9	The monetary-policy instruments of the Eurosystem	40
1.10	The government borrowing norm	47
1.11	Danmarks Nationalbank's gold stock and lending of gold	51
B.1	DN News, screen 12 net position at 3.30 p.m.	63
B.2	Forecasts of the liquidity impact of central-government finances	66f
B.3	Use of Danmarks Nationalbank's information to analyse the development in the net position of the monetary-policy counterparties	68
2.1	Cash market products in the Danish money market	73
2.2	Interest-rate derivatives in the Danish money market	74
2.3	Reference interest rates and conventions in the Danish money market	75
2.4	Market making in the Danish money market	76
2.5	Danmarks Nationalbank's statistics for turnover in cash market products	77
2.6	Products in the Danish foreign-exchange market	80
2.7	Practices and conventions in relation to foreign-exchange transactions	82
2.8	Danmarks Nationalbank's exchange rates	83
2.9	Market making in the Danish foreign-exchange market	84
3.1	Transmission channels	100
4.1	Why low inflation?	117f
4.2	Denmark's foreign-exchange policy	124f
4.3	Monetary aggregates	132

Foreword

Foreword to the 1st edition, June 1999 (published in Danish only)

Danmarks Nationalbank has seen a need for an overall presentation of the Danish approach to monetary policy. There are many textbooks and general publications describing the monetary-policy objectives, strategies and instruments. Each country has its own unique traditions and institutional conditions, however, making it sometimes difficult to see the relationship between the general theories and the specific monetary policy of the individual country.

Danmarks Nationalbank has previously published papers and books on both monetary-policy instruments and issues relating to monetary history. In addition, a number of articles in its *Monetary Review* have described and analysed selected topics. This publication seeks to fill the gap with an overall presentation of Danish monetary policy, based on the situation in 1999.

The publication was prepared by Jacob Topp, Economics.

Many of Danmarks Nationalbank's staff have contributed their comments and suggestions. Danmarks Nationalbank would also like to thank Professor Claus Vastrup and Professor Hans E. Zeuthen for kindly reading the manuscript and making suggestions for improvements. Any remaining errors are Danmarks Nationalbank's responsibility.

Foreword to the 2nd edition, June 2003 (published in Danish and English)

At intervals it is necessary to adjust the contents of a publication to bring it up-to-date. This also applies to "Monetary Policy in Denmark", of which the first edition was published only a few months after the euro had been introduced.

The 2nd edition was prepared by Kim Abildgren, Peter Kjær Jensen and Peter Ejler Storgaard.

CHAPTER 1

The Monetary- and Foreign-Exchange-Policy Instruments

As the Danish central bank Danmarks Nationalbank is responsible for monetary policy in Denmark. Danmarks Nationalbank conducts monetary policy by setting the monetary-policy interest rates, i.e. the discount rate, the current-account rate and the lending rate (equal to the rate of interest for certificates of deposit). Danmarks Nationalbank's interest rates guide the short-term interest rates in the Danish money market, as well as the deposit and lending rates that the banks offer customers.

Denmark maintains a fixed-exchange-rate policy vis-à-vis the euro. This means that the objective of monetary and foreign-exchange policy is to keep the krone stable against the euro. Other aspects than the exchange rate – e.g. cyclical developments in Denmark – are not considered in relation to monetary policy.

The formal framework for the fixed-exchange-rate policy is the European Exchange Rate Mechanism, ERM II. Denmark participates at a central rate of kr. 746.038 per 100 euro and with a fluctuation band of +/- 2.25 per cent. In recent years the krone rate has remained close to the central rate.

Danmarks Nationalbank can influence the krone rate by changing its monetary-policy interest rates. When Danmarks Nationalbank tightens monetary policy, i.e. raises the monetary-policy interest rates, the krone tends to strengthen since it is more attractive to place funds in kroner at the higher rate of interest. When monetary policy is eased, the opposite effect is seen. Danmarks Nationalbank can also keep the krone stable in the short term by intervening in the foreign-exchange market. When Danmarks Nationalbank sells foreign currency (and buys kroner), the krone will tend to strengthen. When Danmarks Nationalbank buys foreign currency (and sells kroner), the krone will tend to weaken.

In practice Danmarks Nationalbank conducts its monetary policy via the monetary-policy counterparties, i.e. the banks and mortgage-credit institutes in Denmark. Danmarks Nationalbank is banker to the mon-

etary-policy counterparties. In this capacity Danmarks Nationalbank holds accounts for the counterparties and manages the settlement of their mutual payments. Within certain limits, the counterparties can make demand deposits with Danmarks Nationalbank and participate in the weekly market operations, where the counterparties can obtain 14-day loans by pledging securities as collateral, or make 14-day deposits by purchasing certificates of deposit. Deposits with and loans from Danmarks Nationalbank accrue interest at the monetary-policy interest rates.

1.1 DANMARKS NATIONALBANK IS BANKER TO THE BANKS

Danmarks Nationalbank is banker to the banks and mortgage-credit institutes. Banks and mortgage-credit institutes – the monetary-policy counterparties – can hold interest-bearing current accounts at Danmarks Nationalbank. These accounts play a key role in monetary policy and payment systems in Denmark:

- Danmarks Nationalbank's lending to and deposits from the monetary-policy counterparties are settled via the counterparties' current accounts.
- Danmarks Nationalbank's other transactions with the counterparties, including foreign-exchange transactions, are likewise settled via the current accounts.
- The current accounts are the backbone of Danmarks Nationalbank's payment system, Kronos, where very large daily liquidity transfers between the counterparties take place.
- Payments to and from the central government are also settled via the current accounts.

The historical background to Danmarks Nationalbank's role as banker to the banks is that Danmarks Nationalbank holds the sole right to issue banknotes. Danmarks Nationalbank was approached when new banknotes were required, and one of Danmarks Nationalbank's most important tasks was to ensure an "elastic" supply of banknotes, e.g. a substantial circulation when economic activity was high.

The issue of banknotes plays no part in monetary policy today. It is easier, cheaper and safer to handle large transactions electronically rather than using physical banknotes and coins, and for the counterparties there is no advantage from holding large quantities of non-interest-bearing banknotes and coins. Nowadays banknotes are primarily used as a means of payment for households on a day-to-day basis, but also for savings purposes to some extent.

Today the role of banker to the banks is closely linked to Danmarks Nationalbank's function as intermediary between the participants in the payment system. The participants accept that claims on Danmarks Nationalbank are risk-free and liquid. This means that claims on Danmarks Nationalbank can always be used to settle accounts between the counterparties or between the counterparties and Danmarks Nationalbank.

It is still a key task for Danmarks Nationalbank to ensure an "elastic" supply of liquidity so that there is always sufficient liquidity in the overall banking system. Ensuring the required liquidity can be divided into two closely related functions:

- Monetary-policy function: ensuring that there is sufficient liquidity in the overall banking system at the close of the day when the counterparties' accounts with Danmarks Nationalbank are settled.
- Payment-system function: ensuring that sufficient liquidity is available to the banking system in the course of the day.

Danmarks Nationalbank conducts its monetary policy via the monetary-policy counterparties, comprising banks and mortgage-credit institutes in Denmark. Variations in the quantity of banknotes and coins are of no significance to monetary policy.

1.1.1 MONETARY POLICY

The monetary-policy counterparties' aggregate accounts with Danmarks Nationalbank in relation to monetary policy are stated on Danmarks Nationalbank's balance sheet and are termed the "net position" vis-à-vis Danmarks Nationalbank.

Danmarks Nationalbank makes available two facilities that give the monetary-policy counterparties the opportunity to earn interest on their net position:

- Firstly, the counterparties have access to make current-account deposits with Danmarks Nationalbank within certain limits. The current account may not be overdrawn overnight. Current-account deposits accrue interest at the current-account rate.
- Secondly, Danmarks Nationalbank conducts market operations whereby the counterparties can borrow or place funds, usually for 14 days. Danmarks Nationalbank conducts its market operations by purchasing and selling certificates of deposit or by lending against collateral in the form of securities. The lending rate is equal to the rate of interest for certificates of deposit, and usually there is no limit to the amounts that the counterparties may borrow or place.

At end-2002 the net position was e.g. composed as follows:

	Kr. billion
Current-account deposits	10.1
+ Certificates of deposit (maturity up to 14 days)	160.7
- Monetary-policy lending by Danmarks Nationalbank (maturity up to 14 days)	81.2
= Counterparties' net position vis-à-vis Danmarks Nationalbank	89.6

The key liquidity concept in monetary policy is the counterparties' current-account deposits, since these funds can immediately be used as means of payment at the initiative of the account holders themselves. Current-account deposits are therefore often referred to as "liquidity", "current-account liquidity" or "krone liquidity".

Overall, the monetary-policy counterparties do not have access to more liquidity than has been provided via Danmarks Nationalbank. The counterparties may trade liquidity with each other, but cannot themselves create liquidity, cf. Box 1.1.

Since the counterparties may not have overdrafts on their current accounts at the close of the day, Danmarks Nationalbank provides liquidity if all counterparties taken as one show a liquidity deficit. This might be necessary if Danmarks Nationalbank's sale of foreign exchange (and purchase of kroner), or the private sector's payments to the central government, lead to an aggregate liquidity deficit. Danmarks Nationalbank will always – via its market operations – ensure that the aggregate current-account funds are sufficient to prevent overdrafts at the close of the day. On the other hand, if the total limit for current-account deposits is reached, Danmarks Nationalbank will issue certificates of deposit.

Danmarks Nationalbank conducts monetary policy by setting the monetary-policy interest rates, i.e. the discount rate, the current-account rate and the lending rate (equal to the rate of interest for certificates of deposit). The interest rates are determined by the Board of Governors of Danmarks Nationalbank, and can be changed as required at any time.

Danmarks Nationalbank's monetary-policy interest rates are the discount rate, the current-account rate and the lending rate (equal to the rate of interest for certificates of deposit). The monetary-policy interest rates guide the short-term money-market interest rates. When the discount rate is changed, the banks often change their customer rates.

Danmarks Nationalbank's interest rates guide the short-term money-market interest rates in Denmark, cf. Chart 1.1. As a result of the compe-

CREATION OF CURRENT-ACCOUNT LIQUIDITY

Box 1.1

The banks and mortgage-credit institutes (the monetary-policy counterparties) cannot themselves create liquidity; they only have access to the liquidity provided via Danmarks Nationalbank. This can be illustrated via the two examples below. In example A, the counterparties trade current-account liquidity among themselves. This does not generate any new liquidity. In example B, Danmarks Nationalbank purchases foreign exchange from the counterparties. This creates liquidity, since Danmarks Nationalbank's payment in kroner for the purchase is credited to the counterparties' current accounts.

EFFECT ON DANMARKS NATIONALBANK'S BALANCE SHEET WHEN COUNTERPARTY A LENDS COUNTERPARTY B KR. 1 BILLION

Example A

Assets	Kr. billion	Liabilities	Kr. billion
Portfolio of domestic bonds		Balance on the central government's account	
Foreign-exchange reserve		Total net position	0
Other		of which: Counterparty A's current account	-1
		Counterparty B's current account	+1
		Banknotes and coins in circulation	
		Net capital	

EFFECT ON DANMARKS NATIONALBANK'S BALANCE SHEET WHEN DANMARKS NATIONALBANK PURCHASES FOREIGN EXCHANGE (KR. 0.5 BILLION FROM EACH OF COUNTERPARTIES A AND B)

Example B

Assets	Kr. billion	Liabilities	Kr. billion
Portfolio of domestic bonds		Balance on the central government's account	
Foreign-exchange reserve	+1	Total net position	+1
Other		of which: Counterparty A's current account	+0.5
		Counterparty B's current account	+0.5
		Banknotes and coins in circulation	
		Net capital	

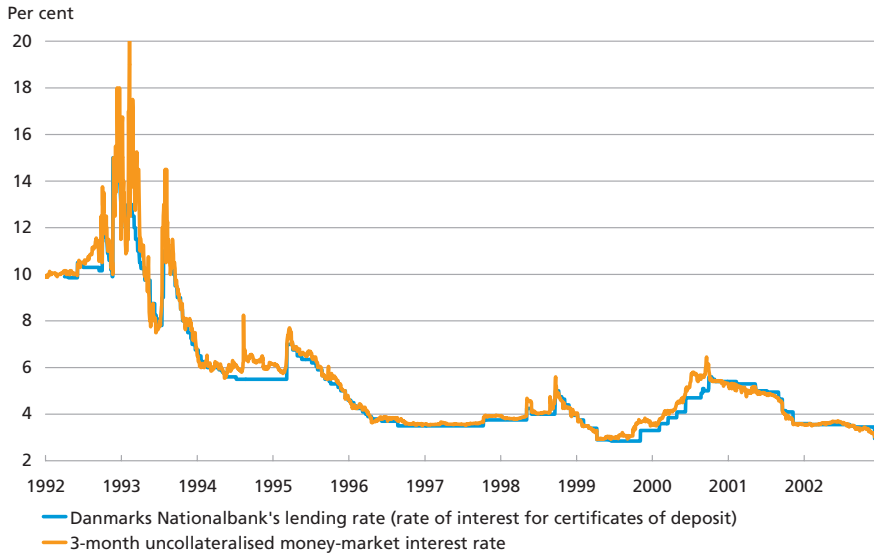
Note: The "other" asset item comprises other assets less other liabilities.

Danmarks Nationalbank's net balance with the monetary-policy counterparties (net position) is shown as a liability on the balance sheet. If the counterparties have a (net) debt, the net position is negative.

tion among the banks in the long term, changes to the banks' deposit and lending rates tend to match larger changes to the discount rate relatively closely, cf. Chart 1.2. This reflects that borrowing from Danmarks Nationalbank or via the money market constitutes a potential marginal source of financing for the individual bank, cf. Chapter 3.

DANMARKS NATIONALBANK'S LENDING RATE AND THE MONEY-MARKET INTEREST RATE

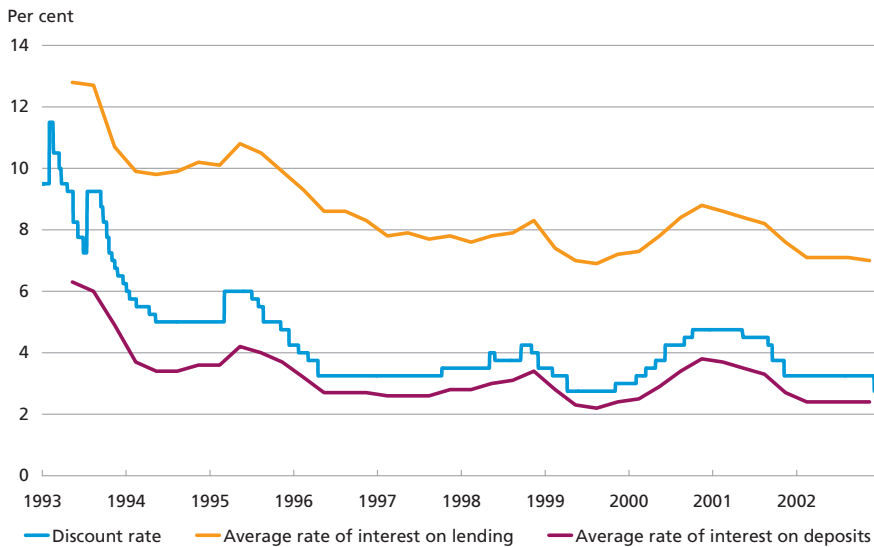
Chart 1.1



Source: Danmarks Nationalbank.

DANMARKS NATIONALBANK'S DISCOUNT RATE AND THE BANKS' AVERAGE RATES OF INTEREST FOR LENDING AND DEPOSITS

Chart 1.2



Note: Discount rate: daily observations.

Rates of interest for lending and deposits: quarterly averages. Comprise the banks' total domestic lending and deposits in kroner, except for accounts with MFIs. In April 2003 Danmarks Nationalbank began to publish new interest-rate statistics with a breakdown by sector which differs from the above, cf. Christoffersen and Jakobsen (2003).

Source: Danmarks Nationalbank.

1.1.2 PAYMENT SYSTEM

Danmarks Nationalbank's role in the payment system is to be the settlement bank for the direct participants. As a consequence Danmarks Nationalbank provides intraday liquidity by permitting overdrafts on the participants' current accounts against collateral (securities or certificates of deposit).

The central liquidity concept in the payment system comprises the sum of current-account deposits and overdraft facilities. Access to intraday current-account overdrafts makes it unproblematic for the participants to settle payments arising at different times during the day. For instance, one bank may require to overdraw its current account at 9 a.m. in order to settle a bond purchase. Later in the day, when the bank receives due payment for transactions with another bank, the overdraft will be covered. Intraday movements in current-account deposits are not regarded as part of the monetary policy, but as settlement of payments.

The participants in the payment system are primarily Danish banks and mortgage-credit institutes. In addition there are certain other financial institutions that are not monetary-policy counterparties, e.g. stock-brokers.

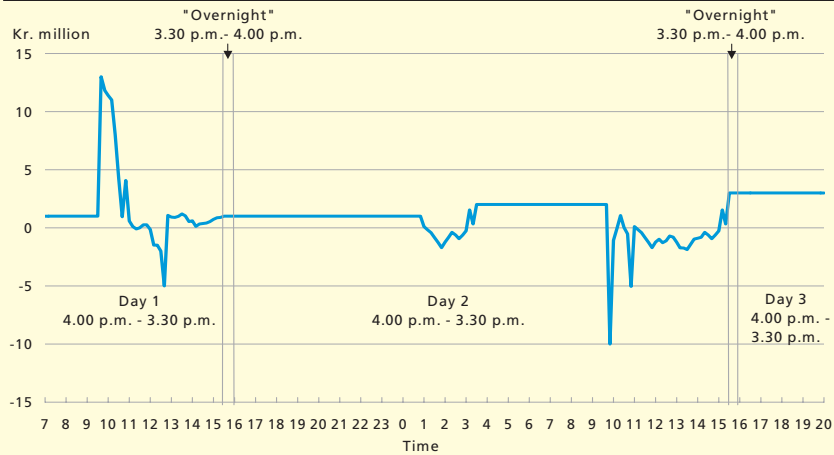
All direct participants in the payment system hold current accounts with Danmarks Nationalbank. For participants that are not monetary-policy counterparties, any overnight deposits on these accounts do not accrue interest, which is in line with international practice in this area. The reason is that interest-bearing current-account deposits are one of the instruments used by Danmarks Nationalbank for conducting monetary policy. The group of counterparties with access to interest-bearing current-account deposits is therefore determined on a monetary-policy basis.

The accounts of banks and mortgage-credit institutes with Danmarks Nationalbank are the central link in the payment system. Via these accounts the banks and mortgage-credit institutions settle large payment volumes among themselves.

It is voluntary for a participant to hold a non-interest-bearing current account for settlement of payments. An alternative option is indirect participation in the payment system via other participants holding current accounts at Danmarks Nationalbank. Payment-system participants who do not hold interest-bearing current accounts can receive interest on their excess liquidity on an overnight basis in the private financial sector.

The following provides a slightly simplified example of the relationship between monetary policy and settlement of payments in Denmark. The example considers a single participant in the payment system. It is assumed that the participant is a monetary-policy counterparty and only holds one account with Danmarks Nationalbank for settlement of both payments and the monetary-policy instruments. During a monetary-policy day the account may be overdrawn against collateral, but overdrafts from one day to another are not permitted. The monetary-policy day runs from 4.00 p.m. to 3.30 p.m. on the following day. In other words, negative balances (overdrafts) are not permitted "overnight" in the period from 3.30 p.m. to 4.00 p.m. on the same day. The Chart below shows how the balance on the participant's account at Danmarks Nationalbank might develop over three monetary-policy days.

EXAMPLE OF DEVELOPMENT IN A COUNTERPARTY'S ACCOUNT AT DANMARKS NATIONALBANK



The chart shows that during a monetary-policy day money is withdrawn from and deposited in the account when various payments are settled. Danmarks Nationalbank's payment system, Kronos, is open for payments in Danish kroner between 7.00 a.m. and 4.30 p.m., except between 3.30 p.m. and 4.00 p.m. when the counterparties' accounts with Danmarks Nationalbank are settled in connection with the start of a new monetary-policy day. Outside the opening hours movements in the deposit may only occur in connection with settlement of payments related to securities registered by VP Securities Services or in connection with the Sumclearing, cf. the description in Appendix 1.A.

As the chart above illustrates, the individual participant's liquidity may fluctuate considerably during the day. If the participants in the system did not have access to overdraft facilities at Danmarks Nationalbank within a monetary-policy day, but had to settle such fluctuations among themselves, this would require considerable money-market transactions during the day, both in numbers and in volumes. Generally the overdraft facility makes the payment system more flexible, since it prevents situations where the individual participants in the payment system do not have sufficient liquidity on the central-bank account to settle payments as required. This reduces the risk of queues and delayed settlement of payments.

The difference between settlement of payments and monetary policy is illustrated in the example in Box 1.2.

Settlement via Danmarks Nationalbank facilitates the functioning of the payment system, and no interest is charged for intraday credit at Danmarks Nationalbank. It is the prevailing convention in Denmark and in most other countries that the minimum unit for accrual of interest is one day.¹

Danmarks Nationalbank's primary role in relation to the krone-denominated payment system is to be the settlement bank for the following systems:

- Kronos, which is Danmarks Nationalbank's payment system where banks and a few other participants mutually settle e.g. large-value payments (wholesale payments) such as money-market transactions and transfer of special-term deposits.
- Sumclearing, which is a payment system where e.g. retail payments are settled between banks. Such payments include cheques, Dankort (debit card) transactions and transfers via BetalingsService (direct debit).
- The VP System, which is VP Securities Services' system for settlement of trades and other payments (e.g. interest and repayments) in connection with securities registered with VP Securities Services.

A more detailed description of Danmarks Nationalbank's role in relation to the payment system is provided in Appendix 1.A.

1.2 THE FIXED-EXCHANGE-RATE POLICY

Denmark has maintained a consistent fixed-exchange-rate policy since the early 1980s. The monetary policy is designed to keep the krone stable vis-à-vis the euro, cf. Chart 1.3, and other aspects than the exchange rate – e.g. the cyclical development in Denmark – are not considered in relation to monetary policy. Before the introduction of the euro at the beginning of 1999, the Danish fixed-exchange-rate policy was oriented towards the D-mark.²

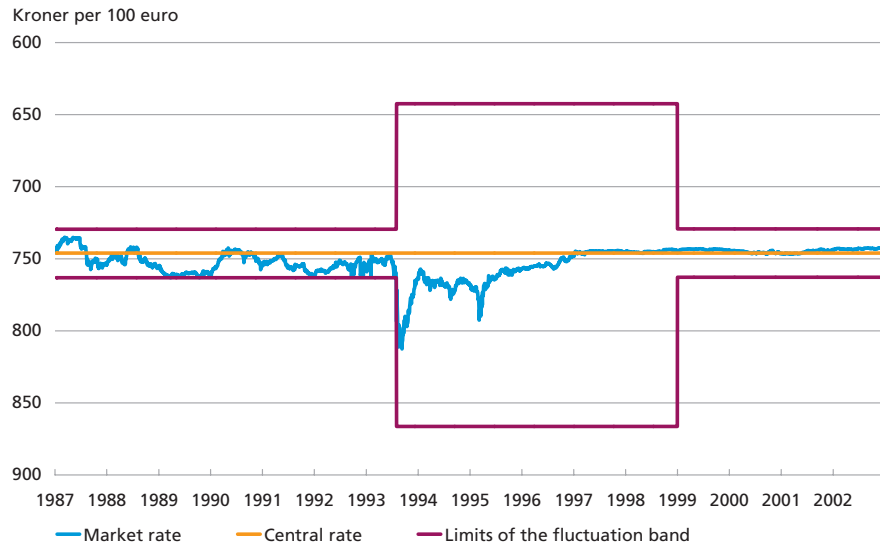
The primary monetary-policy objective in the euro area is to keep inflation below and close to 2 per cent. By keeping the krone stable vis-à-vis the euro, a basis for low inflation is also created in Denmark, cf. Chapter 4.

¹ A key exception is the USA, which operates with accrual of intraday interest in connection with intraday credits from the Federal Reserve, FED, for settlement of payments. The FED charges the banks a fee per minute for intraday overdrafts.

² In a referendum held on 28 September 2000 a proposal for Denmark to adopt the single currency, the euro, was rejected. The following countries introduced the euro as from 1 January 1999: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain. Greece adopted the single currency with effect from 1 January 2001.

EXCHANGE RATE OF THE KRONE VIS-À-VIS THE EURO

Chart 1.3



Note: Before 1999, a synthetic krone rate vis-à-vis the euro is applied, calculated on the basis of the krone rate vis-à-vis the D-mark and the D-mark-to-euro conversion rate fixed at 1 January 1999.

Source: Danmarks Nationalbank.

The formal framework for the Danish fixed-exchange-rate policy is the European Exchange Rate Mechanism (ERM II), cf. Box 1.3.¹ Denmark participates in ERM II with a central rate of kr. 746.038 per 100 euro and a fluctuation band of +/- 2.25 per cent. In recent years the krone has been close to the central rate.

The krone's stabilisation is not just a result of Danmarks Nationalbank's interventions in the foreign-exchange market and Danmarks Nationalbank's interest-rate changes. It is attributable first and foremost to the behaviour of the market participants. In the foreign-exchange market, market participants take positions in the expectation of a stable krone rate, and thereby contribute to stabilising the krone.

Denmark maintains a fixed-exchange-rate policy vis-à-vis the euro. The central rate is kr. 746.038 per 100 euro. The fluctuation band for the krone vis-à-vis the euro is +/- 2.25 per cent. In recent years the krone has been stabilised close to the central rate.

¹ The main principles and provisions for ERM II can be found in the Resolution of the European Council at its meeting in Amsterdam in June 1997, the communiqué issued by the informal meeting of the ECOFIN Council on 25-27 September 1998 in Vienna between the EU member states' ministers for economy and finance and their central-bank governors, and the Agreement of 1 September 1998 between the ECB and the national central banks of the Member States outside the euro area. The Resolution, Communiqué and Agreement can be found at Danmarks Nationalbank's website, www.nationalbanken.dk, under "Monetary Policy", "Exchange Rate Mechanism / ERM II". The Agreement can also be found in the Official Journal of the European Community (1998).

Since the start of the third stage of Economic and Monetary Union (EMU) in the EU on 1 January 1999, Denmark has participated in the European Exchange-Rate Mechanism, ERM II, which replaced the Exchange-Rate Mechanism of the European Monetary System (EMS).

In ERM II a bilateral central rate is fixed for the currency of each participating country vis-à-vis the euro. For each currency the standard fluctuation band for the bilateral exchange rate vis-à-vis the euro is +/- 15 per cent around the central rate.¹ Under the ERM II agreement it is, however, possible to negotiate a narrower band.

If the currency of a participating country reaches the upper or lower limit of the ERM II fluctuation band, both the ECB and the central bank of the country in question must buy the weak currency and sell the strong one to ensure that the exchange rate remains within the fluctuation band. The ECB and the national central bank may suspend intervention if it is in conflict with maintaining price stability.

ERM II allows for changes in the central rates. Decisions relating to central rates and the standard fluctuation band require agreement between the ministers from the euro-area member states, the ECB and the ministers and central-bank governors of the non-euro-area member states participating in ERM II. ERM II is based on the participating countries managing their currencies vis-à-vis the euro so that exchange-rate adjustments are the exception, but not the rule. This requires responsible economic policies (including fiscal policy), which are in line with the agreed exchange-rate relations.

Denmark participates in ERM II at a central rate of 746.038 kroner per 100 euro. The central rate is a conversion of the central rate of the krone vis-à-vis the D-mark in the previous European Exchange-Rate Mechanism (ERM). The central rate of the krone vis-à-vis the D-mark in ERM was last changed on 12 January 1987. Owing to its high degree of economic convergence with the euro area as a result of sustained stability-oriented economic policies, Denmark has been able to enter into an agreement for a narrow fluctuation band of +/- 2.25 per cent. This entails that the margins for the krone are kr. 762.824 per 100 euro and kr. 729.252 per 100 euro. In recent years the exchange rate of the krone has remained stable close to the central rate.

The ERM II system entails that the ECB and the central bank of the participating country may grant each other unlimited intervention credit with an initial maturity of up to 3 months for intervention at the margin. Interest is charged on the credit, which may be extended. This ensures that Denmark's foreign-exchange reserve does not constitute the upper limit for intervention to support the krone. Normally a weakening of the krone initially leads to an increase in interest rates in Denmark. Since the krone has remained close to its central rate throughout the lifetime of ERM II, intervention credits have not been required so far. ERM II has thus acted as a safety net which has not been used.

In the period from 2001 up until now (early June 2003) Denmark has been the only participant in ERM II. With the enlargement of the EU in 2004 more countries can gradually be expected to join. Under the Treaty, one of the convergence criteria for participation in the euro is "the observance of the normal fluctuation margins provided for by the exchange-rate mechanism of the European Monetary System, for at least two years, without devaluing against the currency of any other Member State"².

¹ The euro is thus at the centre of the ERM II since the participating currencies have central rates vis-à-vis the euro, but not vis-à-vis each other as they did in the European Exchange-Rate Mechanism (ERM) which applied before stage three of EMU. ERM II is often referred to as a "hub and spokes" model. The ERM II is described in more detail in Köhler and Thuesen (1997) and Danmarks Nationalbank (1998).

² Article 121 of the Treaty establishing the European Community.

Danmarks Nationalbank can influence the krone rate by changing its monetary-policy interest rates. When the foreign-exchange market is stable, Danmarks Nationalbank normally changes its interest rates in step with the changes of the European Central Bank's minimum bid rate, cf. section 1.4. In a situation with upward or downward pressure on the krone or a sustained inflow or outflow of foreign currency, Danmarks Nationalbank independently changes its interest rates in order to stabilise the krone. Prior to the introduction of the euro in 1999, the spread between the monetary-policy interest rates in Denmark and Germany was key to the Danish monetary policy and the krone rate.

When Danmarks Nationalbank tightens its monetary policy and increases the spread between the monetary-policy interest rates in Denmark and the euro area, the krone will tend to strengthen. This is because it is more attractive to place funds in kroner and more expensive to borrow in kroner when the rate of interest is higher in Denmark than in the euro area. When monetary policy is eased, the opposite tendency is seen.

Chart 1.4 shows the spread between the monetary-policy interest rates in Denmark and the euro area up to the end of 2002 (before 1999 the spread between the monetary-policy interest rates in Denmark and Germany). The Chart illustrates clearly how the spread widens in situations with unrest or uncertainty in the foreign-exchange markets – cf. the periods 1992-93, 1995, 1998 and 2000 – and then gradually narrows once the situation has calmed down.

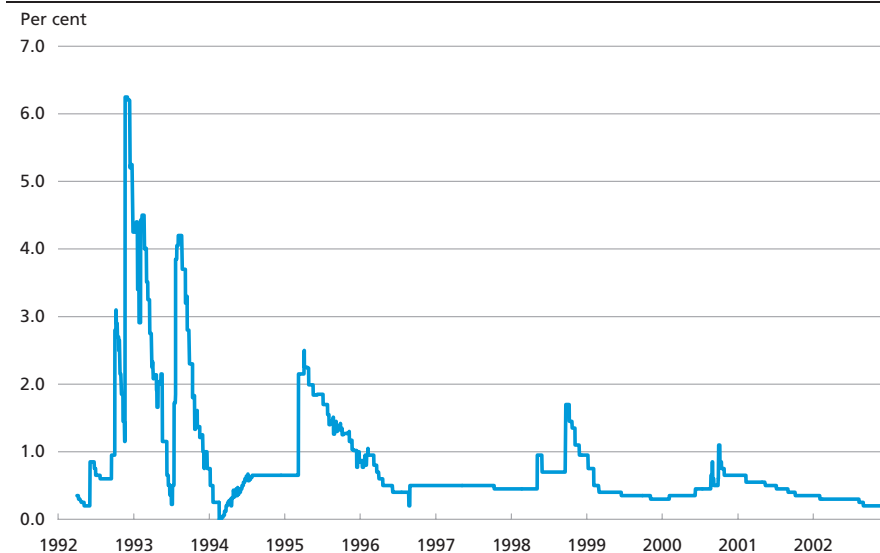
Danmarks Nationalbank can keep the krone stable vis-à-vis the euro via its monetary-policy interest rates. In the short term the krone rate may also be influenced by the purchase and sale of foreign exchange against kroner.

In the short term Danmarks Nationalbank can influence the krone rate by intervening in the foreign-exchange market by selling or purchasing foreign currency against kroner. When Danmarks Nationalbank sells foreign currency (and buys kroner), the krone will tend to strengthen. When Danmarks Nationalbank buys foreign currency (and sells kroner), the krone will tend to weaken. If Danmarks Nationalbank has regularly purchased (sold) foreign currency for a long period of time, this indicates that the interest spread between Denmark and the euro area is too wide (narrow), and consequently Danmarks Nationalbank independently changes its interest rates in relation to the ECB.

Chart 1.5 shows the volume of interventions since 1987. Some of the large interventions during the currency unrest in 1993 were made by

SPREAD BETWEEN MONETARY-POLICY INTEREST RATES IN DENMARK AND IN THE EURO AREA

Chart 1.4

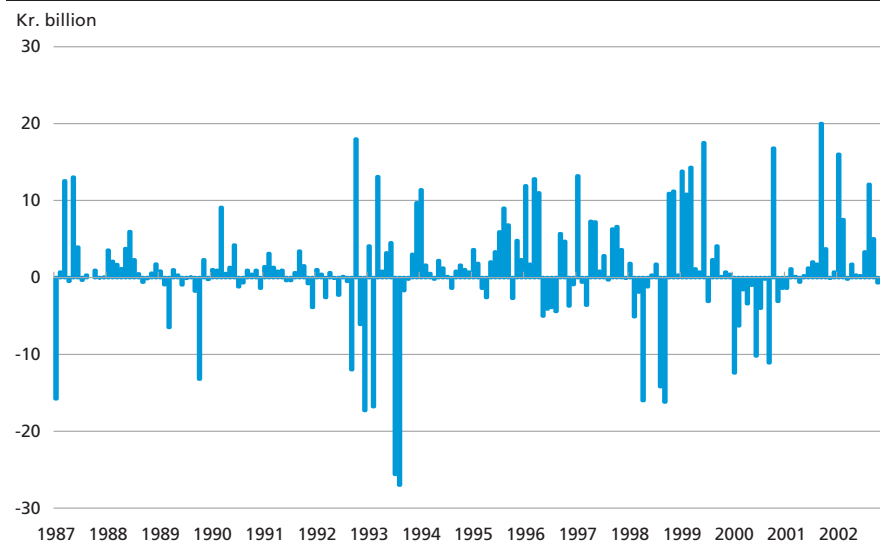


Note: For Denmark, Danmarks Nationalbank's lending rate (or rate of interest for certificates of deposit) is applied for the entire period. For the euro area, the Bundesbank's repo interest rate is applied up to the end of 1998. From 1999 to June 2000 the ECB's fixed tender rate is applied, and thereafter the ECB's minimum bid rate.

Source: Deutsche Bundesbank, ECB and Danmarks Nationalbank.

INTERVENTION PURCHASES OF FOREIGN EXCHANGE AGAINST KRONER

Chart 1.5



Note: Monthly figures by value date. A positive value indicates a net purchase of foreign exchange in the market by Danmarks Nationalbank. The net purchase of foreign exchange is compiled as the net change in the foreign-exchange reserve, excluding exchange-rate adjustments and the central government's net borrowing in foreign exchange. The net purchase of foreign exchange thus includes foreign exchange purchased from the central government by Danmarks Nationalbank as a result of the central government's current foreign-exchange income (e.g. from the EU), as well as Danmarks Nationalbank's purchase of foreign exchange in the market to cover the central government's current foreign-exchange expenditure (e.g. to service its foreign debt).

Source: Danmarks Nationalbank.

DANMARKS NATIONALBANK'S USE OF INTERVENTION AND CHANGES IN INTEREST RATES

Box 1.4

In August 1998 sustained pressure on the Norwegian krone meant that after several increases in interest rates Norges Bank in reality let the Norwegian krone float on 24 August. The Danish krone was exposed to short-term pressure. Danmarks Nationalbank intervened for a significant amount in the foreign-exchange market, but did not change the monetary-policy interest rates. On 25 and 26 August before noon Danmarks Nationalbank thus intervened for kr. 16 billion in support of the krone. As on previous occasions, the money-market interest rates rose significantly, which made speculation more expensive and helped to maintain the krone rate. The wave of speculation subsided, and on the afternoon of 26 August Danmarks Nationalbank could buy back foreign exchange while the krone strengthened.

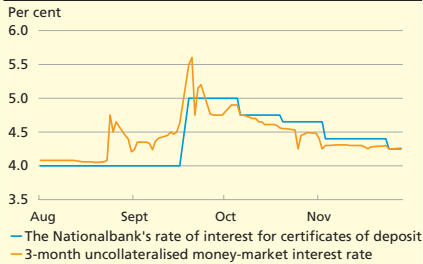
THE DANISH KRONE RATE IN 1998



Note: A synthetic exchange rate for the krone vis-à-vis the euro has been applied, calculated on the basis of the krone rate vis-à-vis the D-mark and the conversion rate between the euro and the D-mark fixed as from 1 January 1999.

Source: Danmarks Nationalbank.

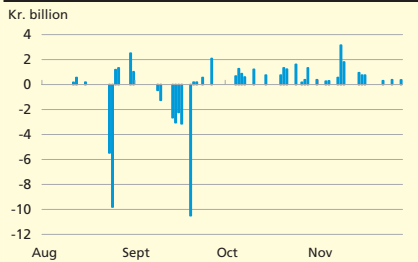
INTEREST RATES IN 1998



Note: Throughout the period shown, Deutsche Bundesbank's repo rate was 3.3 per cent.

Source: Danmarks Nationalbank and Deutsche Bundesbank.

INTERVENTIONS IN 1998



Note: Danmarks Nationalbank's net foreign-exchange purchase by trading days.

Source: Danmarks Nationalbank.

September saw renewed pressure on the krone in connection with general unrest in the international financial markets. The main background to the unrest was that Russia in August ceased to service its debt and gave up its attempts to stabilise the rouble vis-à-vis the dollar. The unrest in the markets meant that a large US hedge fund, Long Term Capital Management (LTCM) experienced problems.

Danmarks Nationalbank intervened to support the krone for almost kr. 13 billion in the period 10-18 September in order to keep the krone stable. Since the need to intervene, unlike in August, turned out to be more sustained, the monetary-policy interest rates were raised with effect from 21 September.

The pressure on the krone continued immediately after the increase in interest rates, owing to uncertainty about the Scandinavian currencies after an election in Sweden, and Danmarks Nationalbank had to intervene once more. Intervention on 21 September totalled just over kr. 10 billion.

The pressure soon eased, however, and Danmarks Nationalbank was able to purchase foreign exchange (and thus sell kroner) while the krone strengthened. This enabled gradual lowering of the monetary-policy interest rates in October and November.

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other central banks to support the krone under the European Exchange Rate Mechanism (ERM) existing at that time. In the period from mid-1993 to date (early June 2003) the interventions have been made solely by Danmarks Nationalbank within the fluctuation band (intramarginal intervention, cf. section 1.6).

The free movement of capital and the greater international diversification of Danish and foreign investors' portfolios are reflected in Danmarks Nationalbank's intervention purchases and sales of foreign exchange. Even when the currency markets are calm intervention amounts may reach a size previously only seen in connection with actual currency crises.

Box 1.4 outlines a concrete example from the autumn of 1998 of Danmarks Nationalbank's use of intervention and interest-rate changes in order to manage the krone rate.

1.3 THE MONETARY-POLICY INSTRUMENTS

In practice Danmarks Nationalbank conducts monetary policy via the "monetary-policy instruments". This term covers the facilities used by Danmarks Nationalbank to manage and service accounts with the monetary-policy counterparties (i.e. the banks and mortgage-credit institutes).

Danmarks Nationalbank's monetary-policy instruments have generally remained unchanged since 1992.¹ The monetary-policy counterparties have access to two facilities:

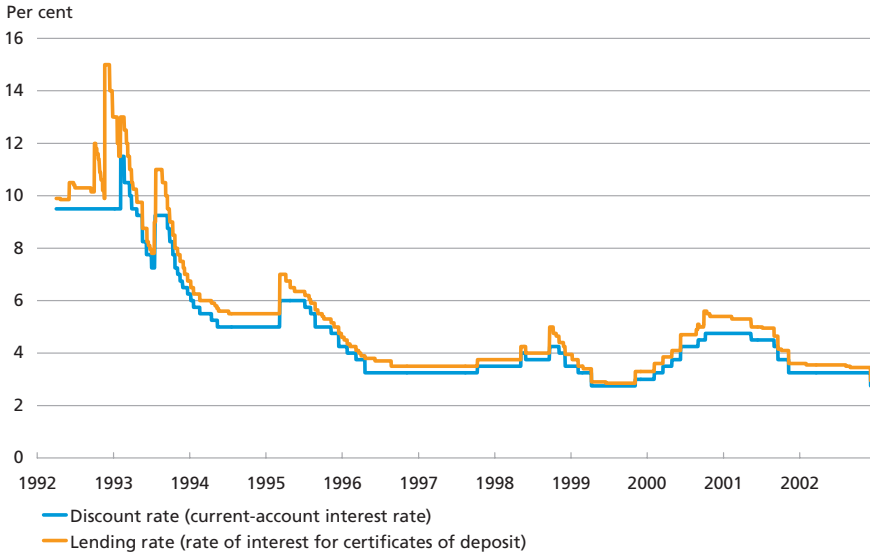
- Overnight current-account deposits. A ceiling has been placed on the counterparties' total current-account deposits at the close of the day. This ceiling is implemented as individual current-account limits for the counterparties.
- Weekly market operations whereby the monetary-policy counterparties either borrow against securities as collateral (monetary-policy loans) or make placements by purchasing certificates of deposit. These transactions usually have a maturity of 14 days.

The rates of interest on the two types of 14-day transactions are normally identical and known as respectively the lending rate and the rate of interest for certificates of deposit. Current-account deposits accrue interest at the current-account interest rate, which is lower than the lending rate, cf. Chart 1.6. In the period from April 1992 to date (early June 2003) the current-account interest rate has been equal to the discount rate.

¹ Recent years' experience with the use of the monetary-policy instruments is described in Danmarks Nationalbank (2003b).

DANMARKS NATIONALBANK'S MONETARY-POLICY INTEREST RATES

Chart 1.6



Note: Throughout the period shown the current-account interest rate has been equal to the discount rate.
Source: Danmarks Nationalbank.

None of the monetary-policy instruments directly accrue interest at the discount rate. The discount rate is rather a signal rate indicating the overall level of the monetary-policy interest rates.

Danmarks Nationalbank's interest rates guide the short-term money-market interest rates in Denmark. A change in the discount rate normally entails that the banks change the interest rates offered to most customers. Danmarks Nationalbank's lending rate (and the rate of interest for certificates of deposit) is usually changed more frequently and in smaller steps than the discount rate. In brief periods of currency unrest Danmarks Nationalbank may thus choose to increase its lending rate without changing the discount rate. This mainly affects money-market interest rates, capital movements and the krone rate, while the interest rates offered by banks to retail customers are to some extent protected, cf. Chapter 3.

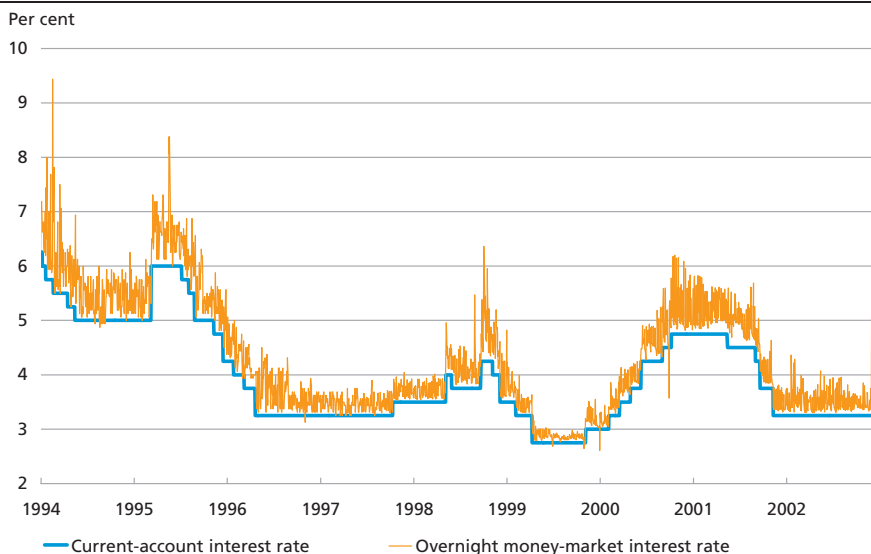
Danmarks Nationalbank regularly publishes a wide range of data on the monetary-policy and foreign-exchange-policy instruments and their use, cf. the overview in Appendix 1.B.

1.3.1 CURRENT-ACCOUNT DEPOSITS

Current-account deposits with Danmarks Nationalbank are demand deposits which the monetary-policy counterparties may use as means of payments without notice and at their own initiative.

DANMARKS NATIONALBANK'S CURRENT-ACCOUNT INTEREST RATE AND THE OVERNIGHT INTEREST RATE IN THE MONEY MARKET

Chart 1.7



Note: The overnight money-market interest rate applied is an uncollateralised overnight interest rate up to and including end-1997. After that, it is the uncollateralised turnover-weighted T/N interest rate.

Source: Danmarks Nationalbank.

The current-account deposits of the monetary-policy counterparties accrue interest at the current-account interest rate, which is an overnight interest rate, i.e. a rate of interest on one-day deposits. The current-account rate is usually the lowest overnight rate in the money market. The reason is that for a monetary-policy counterparty placement on a current account with Danmarks Nationalbank always represents an alternative to lending via the money market, provided that the overall ceiling on current-account deposits has not been exceeded. The very short-term money-market interest rate has only fallen slightly below the current-account rate in extraordinary cases, cf. Chart 1.7. Furthermore, the overnight interest rate in the money market will tend to be close to the current-account rate. This reflects the fact that current-account deposits with Danmarks Nationalbank are the only way that the monetary-policy counterparties taken as one can earn interest on excess krone liquidity outside the weekly market operations.

The overnight interest rate fluctuates somewhat, partly reflecting the fluctuations in the total current-account deposits. The counterparties do not have access to overnight loans from Danmarks Nationalbank, and in principle Danmarks Nationalbank only provides liquidity via the regular weekly market operations on the last banking day of the week. It is

deemed to be important to a well-functioning money market that the counterparties trade liquidity among themselves on market terms. Danmarks Nationalbank's foreign-exchange transactions and the central government's payments in kroner will therefore initially be reflected in the current-account deposits. Fluctuations in the supply and distribution of liquidity will impact the overnight interest rate. Counterparties with positive current-account deposits will seek to gain a profit by lending to other counterparties that are short of liquidity. The lower the level of total current-account deposits, the higher the interest rate is normally on very short-term lending in the money market.

Fluctuations in the overnight interest rate may also occur for more technical reasons, cf. Box 1.5. Such fluctuations do not affect the more long-term money-market interest rates, which are the most important in relation to capital movements and the krone rate, and which are therefore in focus of the monetary policy.

Current-account deposits are liquidity which the banks and mortgage-credit institutes can use as a means of payment without notice and at their own initiative. The current-account interest rate sets the lower limit to the market rate for overnight liquidity.

Danmarks Nationalbank's instruments do not set a direct upper limit for the overnight interest rate in the money market. In practice Danmarks Nationalbank will, however, always open for market operations if the total current-account deposits at the close of the day are very small, or if there is a direct risk of a current-account overdraft by the counterparties taken as one. The reason is that liquidity can only be created via Danmarks Nationalbank, which in turn ensures that the overall liquidity of the counterparties does not become negative. In this way the overnight interest rate is subject to an implicit ceiling.

Danmarks Nationalbank has introduced an overall ceiling (a limit) on the monetary-policy counterparties' current-account deposits at the close of the day (i.e. at the close of the monetary-policy day at 3.30 p.m.). A ceiling is thus imposed on the volume of overnight krone liquidity which the counterparties taken as one can obtain at their own initiative. The purpose of the current-account-limit system is to discourage the build-up of large current-account deposits which could be used to speculate in changes in interest and exchange rates.

The total limit is approximately kr. 20 billion, broken down as individual current-account limits for the counterparties. If the total limit is exceeded at the close of the day, deposits exceeding the individual limits

TECHNICAL VOLATILITY IN THE OVERNIGHT INTEREST RATE

Box 1.5

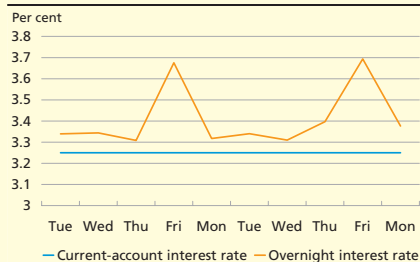
The overnight interest rate in the money market on the first four banking days of the week will tend to be close to the current-account interest rate. The reason is that for the counterparties taken as one current-account deposits with Danmarks Nationalbank constitutes the only opportunity to gain interest on excess krone liquidity on these days.

On the last banking day of the week, when Danmarks Nationalbank is open for sale of certificates of deposit, counterparties with excess liquidity may – in addition to making current-account deposits – purchase certificates of deposit and thereby place liquidity with Danmarks Nationalbank at the rate of interest for certificates of deposit, which is higher than the current-account interest rate. If they instead choose to lend the liquidity on an overnight basis in the money market on the last banking day of the week, it should be taken into account that during the first four banking days of the following week the liquidity can only be expected to be re-placed in the money market at a rate of interest close to the current-account interest rate (or with Danmarks Nationalbank at the current-account interest rate). The overnight interest rate on the last banking day of the week (which also applies during the weekend) must therefore be relatively high to

give a counterparty with excess liquidity an incentive to lend in the overnight market rather than purchase certificates of deposit from Danmarks Nationalbank.

This leads to the "high weekend interest rates" that are very apparent from the Chart, which shows the overnight interest rate during a period in March 2002. In the period considered, the current-account interest rate was 3.25 per cent, and the rate of interest for certificates of deposit 3.55 per cent. If a market participant expects the overnight interest rate during the next

DEVELOPMENT IN THE OVERNIGHT INTEREST RATE IN MARCH 2002



Note: The overnight interest rate applied is the uncollateralised turnover-weighted T/N interest rate shown on the settlement days from 12 March 2002 onwards.

Source: Danmarks Nationalbank.

week to be equal to the current-account interest rate from Monday to Thursday, and lending in the overnight market is to be just as profitable, over a week, as purchasing certificates of deposit, the overnight interest rate on the Friday must be 3.95 per cent (since the expected interest receivable when lending in the overnight market can be approximated at 3.95 per cent for 3 days and 3.25 per cent for 4 days, i.e. 3.55 per cent on average, which is equal to the rate of interest for certificates of deposit). In the period considered, the Friday rate of interest did not quite reach this level, and the overnight interest rate was slightly higher than the current-account interest rate during the first four days of the weeks. This reflects the fact that – in addition to the technical conditions relating to the spread between the rate of interest for certificates of deposit and the current-account interest rate – the overnight interest rate in the money market also depends on supply of and demand for liquidity and the distribution of liquidity among the counterparties, cf. the body text. In addition, the overnight interest rate in the money market is normally expected to be slightly higher than the current-account interest rate due to the credit risk incurred when lending on an uncollateralised basis in the money market, rather than placing the liquidity with Danmarks Nationalbank.

will be converted into certificates of deposit. Conversion is to the certificate with the longest remaining term to maturity in order to tie up excess liquidity for a certain period so that it cannot immediately be used for outright speculation.

The current-account-limit system only comes into force if the current-account deposit exceeds the total limit. The monetary-policy counterparties may exceed their individual limits, provided that the total limit is not exceeded. Deposits exceeding the individual limits also accrue interest at the current-account rate for as long as the overall current-account limit is not exceeded.

Via extraordinary operations in certificates of deposit Danmarks Nationalbank contributes to ensuring that the current-account limits do not present a problem in relation to the daily settlement of payments. If there are indications during the day that the current-account deposits at the close of the day will exceed the total current-account limit, Danmarks Nationalbank normally opens for sale of certificates of deposit. To date (early June 2003) it has therefore not been necessary to convert current-account deposits into certificates of deposit.¹

The individual current-account limits are determined on the basis of the counterparties' size and activity in the money market. The limits are updated at intervals.²

1.3.2 DANMARKS NATIONALBANK'S MARKET OPERATIONS

Danmarks Nationalbank conducts its market operations via two instruments: monetary-policy loans against securities as collateral, and certificates of deposit issued by Danmarks Nationalbank. All other things being equal, the sale (purchase) of certificates of deposit reduces (increases) the current-account deposits, while monetary-policy lending increases the current-account deposits.

Both monetary-policy loans and certificates of deposit accrue interest at a 14-day rate which is higher than the current-account rate, typically 0.1-0.5 per cent higher, but there are no fixed rules. When Danmarks Nationalbank's 14-day rate is higher than the current-account rate, the counterparties are encouraged to limit their current-account deposits. The current-account limits also provide a ceiling over the counterparties' liquidity, thereby limiting the liquidity which the counterparties might

¹ The present current-account-limit system was introduced in June 1999.

² A list of the current-account limits can be found at Danmarks Nationalbank's website, www.nationalbanken.dk, under "Monetary policy", "Instruments" or under "Rules", "Monetary and foreign-exchange policy".

REGULAR WEEKLY MARKET OPERATIONS

Box 1.6

Danmarks Nationalbank's regular market operations are conducted once a week. In the regular market operations the monetary-policy counterparties distribute their net position on current-account deposits, certificates of deposit and loans against collateral so that they have sufficient overall liquidity on their current accounts to handle the expected liquidity fluctuations in the next week. Individual liquidity requirements during the week are settled in the money market since Danmarks Nationalbank does not permit overdrafts on the counterparties' current accounts at the close of the day at 3.30 p.m.

The regular market operations usually take place on the last banking day of each week. Danmarks Nationalbank's sales of certificates of deposit takes place between 10.00 a.m. and 3.30 p.m., while loan transactions can be concluded between 10.00 a.m. and 1.00 p.m. The opening hours for monetary-policy lending are shorter than for certificates of deposit so that in periods of unrest in the currency markets Danmarks Nationalbank has a overview of the counterparties' aggregate liquidity situation well before the close of the monetary-policy day.

In the regular market operations monetary-policy loans and certificates of deposit usually have a maturity of 14 days. At certain intervals Danmarks Nationalbank, however, gives the counterparties the option to buy both short-term (7-day) and long-term (14-day) certificates of deposit in order to even out any undesired differences in the size of the short-term and long-term series.

Both monetary-policy loans and certificates of deposit are settled on the day of operation with immediate liquidity effect. The rate of interest on monetary-policy loans (the lending rate) is equivalent to the rate of interest for certificates of deposit, and there are no quantitative restrictions on the counterparties' purchases of certificates of deposit and conclusion of monetary-policy loans. The pledging of collateral in connection with monetary-policy loans is described in Appendix 1.C.

At any given time there are always two outstanding series of certificates of deposit and two outstanding series of monetary-policy loans. Each series has a year and week number referring to the time when it matures (e.g. 03/24 for the certificate of deposit/monetary-policy loan which matured in week 24, 2003).

When a loan transaction is entered into, the loan is debited to a loan account, and the proceeds are credited to the current account. When the loan transaction matures, the interest is debited to the loan account, after which the borrowed amount, including interest, is transferred from the current account to the loan account. The loan is due for repayment before Danmarks Nationalbank's payment system (Kronos) opens on the expiry date. When a certificate of deposit is purchased, the purchase price is withdrawn from the current account, while the nominal value of the certificate of deposit is registered on the certificate-of-deposit account. When the certificate of deposit matures, its nominal value is credited to the current account of the relevant counterparty before the opening hours, and the nominal value is debited to the certificate-of-deposit account. Certificates of deposit are zero-coupon paper where the interest on the certificates of deposit is the difference between the purchase price and the redemption price (par value).

Notification of regular sale of certificates of deposit, conclusion of loan transactions and the rate of interest at which the transactions can be entered into usually takes place at 10.00 a.m. on the last banking day in the week via DN News (screen 11).

at their own initiative use to speculate in changes in interest and exchange rates.¹

Danmarks Nationalbank conducts regular market operations once a week, cf. Box 1.6. Generally, the weekly market operations are to adjust the current-account deposits at Danmarks Nationalbank to make them sufficient to cover the counterparties' liquidity requirement during the coming week.

All other things being equal, the monetary-policy counterparties have a financial incentive to limit their current-account deposits since Danmarks Nationalbank's 14-day interest rates always exceed the current-account rate. When current-account deposits involve a certain interest-rate loss, this tends to imply that the total current-account deposits are sufficient, but that individual liquidity fluctuations during the week are settled via the money market. This supports the need for a well-functioning money market where the counterparties exchange liquidity among themselves on market terms, rather than trading directly with Danmarks Nationalbank.

Due to this construction, a need may arise for Danmarks Nationalbank to give access to extraordinary market operations during the week. If, for instance, a large payment to the central government is due, it may be necessary for Danmarks Nationalbank to supply extraordinary liquidity to the market in order to prevent the overall current-account deposits from dropping below zero. Via such operations liquidity is fine-tuned. The extraordinary market operations usually take place in certificates of deposit that can be sold or purchased with immediate liquidity effect, cf. Box 1.7.

In Danmarks Nationalbank's weekly market operations the counterparties can obtain 14-day loans by pledging securities as collateral, or make 14-day deposits by purchasing certificates of deposit. Danmarks Nationalbank's 14-day interest rate is important to the more long-term money-market rates.

¹ Seen from the counterparties' point of view, the total net position vis-à-vis Danmarks Nationalbank is given on the basis of the other items on Danmarks Nationalbank's balance sheet and is affected by movements in these items. In the short term particularly the government's krone-denominated net payments may entail fluctuations in the net position. In the longer term the net position is primarily influenced by Danmarks Nationalbank's purchase and sale of foreign exchange, cf. Section 1.5. In Danmarks Nationalbank's market operations the counterparties must decide overall – within the limits for current-account deposits – how much of the net position to place in liquid funds (current account) and how much in net terms to place in 14-day contracts (certificates of deposit less monetary-policy loans). This choice can be theoretically described via a portfolio model where the choice reflects the liquidity requirement versus the wish for the maximum return. Current-account deposits entail a loss of interest, since the 14-day interest rate is higher than the current-account interest rate. On the other hand, 14-day transactions entail a loss of liquidity since only current-account deposits are fully liquid.

EXTRAORDINARY MARKET OPERATIONS

Box 1.7

Danmarks Nationalbank's extraordinary market operations comprise sale and buy-back of certificates of deposit.

In buy-backs of certificates of deposit Danmarks Nationalbank sets a premium on the certificate-of-deposit interest rate. The premium may be fixed or variable, e.g. related to a market interest rate. In the period from August 1997 up until now (early June 2003) all buy-backs of certificates of deposit have been with a premium of 0.05 per cent.

In buy-backs of certificates of deposit a distinction is usually drawn between three types of operations:

- Buy-back of certificates of deposit in both open series in connection with known large central-government receipts which have been announced beforehand in connection with Danmarks Nationalbank's forecasts of central-government payments, cf. Appendix 1.B.
- Buy-back of certificates of deposit in both open series in connection with fluctuations in the factors affecting liquidity compared to the forecasts, primarily owing to shifts in central-government payments and Danmarks Nationalbank's purchases of foreign exchange. Such operations are usually announced at 10.00 a.m. on the day of operation via DN News (screen 11).
- Unannounced buy-backs which normally take place via a money-market broker. In unannounced buy-backs a distinction is drawn between the situations where liquidity fluctuations are unexpected and situations where the counterparties could have predicted the liquidity fluctuations. In the latter case the certificate of deposit with the longest remaining term to maturity is bought back and otherwise the certificate with the shortest remaining term to maturity. This practice is aimed at giving the counterparties an incentive to manage their liquidity appropriately. In most cases the monetary-policy counterparties prefer to sell back the certificate of deposit with the shortest remaining term to maturity since they then pay the premium for a lower number of days.

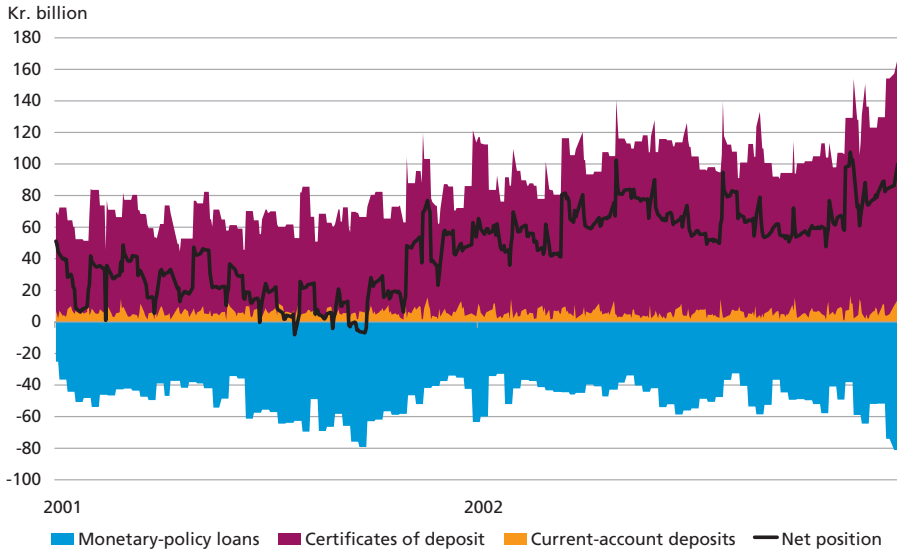
Extraordinary liquidity absorption usually takes place via sale of certificates of deposit. No premium (or deduction) is applied to the rate of interest when certificates of deposit are sold in extraordinary operations.

On the first banking day of the month Danmarks Nationalbank is usually open for sale of certificates of deposit as a result of large government disbursements. In addition to this operation, an average of 1-2 announced operations and 1 unannounced take place every month.

There is relatively strong day-to-day fluctuation in the net position, cf. Chart 1.8. The fluctuation is important to daily liquidity management, but is normally of no significance to monetary policy. A shift in the net position's sign does not in itself lead to changes in interest rates since the 14-day interest rates for certificates of deposit and monetary-policy loans are identical. This is also reflected in the fact that Danmarks Nationalbank does not have a target for the size or sign of the net position.

THE NET POSITION OF THE MONETARY-POLICY COUNTERPARTIES VIS-À-VIS
DANMARKS NATIONALBANK

Chart 1.8



Source: Danmarks Nationalbank.

Box 1.8 shows one month's day-to-day fluctuations in the net position as a result of movements in the various factors affecting liquidity. The Box also illustrates how the fluctuations in the net position lead to fluctuations in the counterparties' use of the monetary-policy instruments.

As Box 1.8 shows, a large part of the day-to-day fluctuations in the net position relate to central-government payments. To facilitate the monetary-policy counterparties' liquidity planning, Danmarks Nationalbank therefore regularly publishes forecasts of central-government payments, cf. Appendix 1.B. At the same time Danmarks Nationalbank publishes dates for its planned purchase and sale of certificates of deposit.

Certificates of deposit can be traded among the monetary-policy counterparties, but cannot be negotiated outside their circle. Trading in certificates of deposit among counterparties does not affect the counterparties' total liquidity, but may be used to exchange liquidity without credit risk for settlement on the same day. The volume of trading in certificates of deposit among counterparties has, however, so far been relatively modest compared with the total transaction volume in the money market, cf. the figures in Chapter 2.

Under normal circumstances managing the liquidity volume does not play a role in monetary policy. In principle there is therefore no limit to the counterparties' build-up of gross assets and liabilities vis-à-vis Danmarks Nationalbank – and since the lending rate and the rate of interest

USE OF THE MONETARY-POLICY INSTRUMENTS IN PRACTICE

Box 1.8

The Table below shows day-to-day changes in the net position during one month and the resulting fluctuations in the use of instruments.

DAY-TO-DAY CHANGES IN THE NET POSITION, JANUARY 2002

Date	Impact on the net position from					Change in the counter-parties' net position	Change in net position broken down by		
	The central government liquidity impact (a)	Danmarks Nationalbank's purchase of foreign exchange	Danmarks Nationalbank's purchase of bonds	Banknotes and coins	Other		Current-account deposit	Certificates of deposit	Monetary-policy loans ("-" indicates increased borrowing)
2. (Wed) .	14.4	-1.0	-0.4	0.6	-1.9	11.7	8.2	3.5	0.0
3. (Thu) ..	-3.6	0.7	-0.9	0.4	0.9	-2.5	-2.5	0.0	0.0
4. (Fri)	-4.3	0.1	0.0	0.3	0.0	-3.9	-3.3	-4.0	3.4
7. (Mon) .	-7.2	3.7	0.0	0.3	-0.2	-3.5	-2.8	-0.7	0.0
8. (Tue) ..	1.6	0.0	0.0	0.3	-0.1	1.9	1.9	0.0	0.0
9. (Wed) .	0.9	-0.1	0.0	0.4	0.2	1.4	1.4	0.0	0.0
10. (Thu) .	0.0	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
11. (Fri) ...	-2.9	0.2	0.0	0.1	0.0	-2.6	0.6	-28.7	25.5
14. (Mon) .	0.7	0.2	0.0	0.2	-0.1	1.0	1.0	0.0	0.0
15. (Tue) ..	3.5	0.0	-0.4	0.1	0.4	3.6	3.6	0.0	0.0
16. (Wed) .	0.0	0.1	0.0	0.2	0.0	0.3	0.3	0.0	0.0
17. (Thu) ..	-6.2	0.0	-0.1	0.1	-0.1	-6.2	-6.2	0.0	0.0
18. (Fri)	2.7	4.6	-0.1	0.0	0.0	7.2	-3.4	9.2	1.4
21. (Mon) .	-14.9	-0.1	-0.1	0.1	0.0	-15.0	1.6	-16.7	0.0
22. (Tue) ..	-1.6	0.0	0.0	0.2	0.0	-1.4	-1.4	0.0	0.0
23. (Wed) .	0.3	0.1	0.0	0.1	0.0	0.5	0.5	0.0	0.0
24. (Thu) ..	1.0	0.9	0.0	0.0	0.2	2.2	2.2	0.0	0.0
25. (Fri)	-3.9	0.0	0.0	0.0	0.0	-4.0	-0.3	15.4	-19.2
28. (Mon) .	1.3	0.0	0.0	-0.1	0.1	1.4	1.4	0.0	0.0
29. (Tue) ..	-12.6	2.9	0.0	-0.1	0.0	-9.8	-4.4	-5.4	0.0
30. (Wed) .	11.3	2.0	0.0	-0.3	-0.2	12.8	12.8	0.0	0.0
31. (Thu) ..	3.7	1.6	0.0	-0.4	0.2	5.2	-6.4	11.5	0.0

(a) Gross domestic financing requirement less government borrowing in kroner.

Movements in the net position during the month were mainly attributable to the central government's payments and Danmarks Nationalbank's net foreign-exchange purchases, while fluctuations in the other items were small.

On the instruments side it is seen that the regular weekly market operations (on Fridays) adjusted the liquidity so well that on 13 of the remaining 18 banking days in that month no further market operations were required. On these days the current accounts absorbed the fluctuations in the net position.

On Monday, 21 January and Tuesday, 29 January buy-back of certificates of deposit had been pre-announced, while both buy-back and sale of certificates of deposit had been pre-announced on Wednesday, 2 January. On the first banking day of the month Danmarks Nationalbank is usually open for sale of certificates of deposit as a result of large government disbursements, but on 2 January Danmarks Nationalbank also chose to be open for buy-back of certificates of deposit, *inter alia* as a result of large regular payments on mortgage-credit bonds on that day.

CONTINUED

Box 1.8

On two occasions it was necessary to conduct unannounced operations in certificates of deposit. On 7 January the liquidity-absorbing effect of the government finances was larger than expected. Consequently, the counterparties' current-account deposit became low, and since it was distributed among many counterparties Danmarks Nationalbank chose to provide a small amount of liquidity by buying back short-term certificates of deposit. On 31 January an unannounced sale of certificates of deposit took place, following Danmarks Nationalbank's purchase of foreign exchange in excess of kr. 6 billion over three days and a resulting increase in the counterparties' current-account deposit. Without operations on the part of Danmarks Nationalbank, the total current-account deposit would have been very close to the overall current-account limit of approximately kr. 20 billion.

for certificates of deposit are identical, any such gross build-up does not entail interest costs for the counterparties. In practice the counterparties' demand for loans and certificates of deposit depends primarily on the net position. Even if the latter is negative, the counterparties will require a certain volume of certificates of deposit since selling back certificates of deposit is the only way to obtain liquidity during the week for the counterparties taken as one, provided that Danmarks Nationalbank is prepared to buy back certificates of deposit.

Within the framework of the monetary-policy rules applying at any time, Danmarks Nationalbank always reserves the right to change the "rules of the game" without notice if this is deemed necessary in relation to the monetary and foreign-exchange policy. In the event of currency unrest Danmarks Nationalbank may thus replace the ordinary use of the instruments with management of liquidity volume or adjust the term to maturity for monetary-policy loans and certificates of deposit. The use of quantitative limitations to the counterparties' access to liquidity from Danmarks Nationalbank is, however, used only on very rare occasions. The last instance was in 1993 in connection with the crisis in the European Exchange-Rate Mechanism.

1.3.3 MONETARY- AND FOREIGN-EXCHANGE-POLICY COUNTERPARTIES

Danmarks Nationalbank's monetary-policy counterparties are banks and mortgage-credit institutes that operate under the Danish Commercial Banks and Savings Banks Act or the Mortgage Credit Act and meet certain technical criteria. Danmarks Nationalbank may also give Danish branches of foreign credit institutions conducting equivalent business access to the monetary-policy instruments. Danmarks Nationalbank selects its monetary-policy counterparties on the basis of monetary-policy

considerations. The delimitation of the group of counterparties is, *inter alia*, based on the expectation that the large monetary-policy counterparties are active participants in the money market and thereby contribute to ensuring a well-functioning marketplace with efficient price formation.

At end-2002 the number of monetary-policy counterparties in Denmark was 119, of which 115 were banks and 4 mortgage-credit institutes. The potential number of counterparties is just over 200. The banks and mortgage-credit institutes which do not have relations with Danmarks Nationalbank (typically small banks) handle their liquidity via accounts with correspondent banks.

Only banks and mortgage-credit institutes may have access to the monetary-policy instruments.

The monetary-policy loans are usually distributed among a relatively small number of counterparties. The number varies with the net position, but normally 10-20 counterparties have raised loans from Danmarks Nationalbank. The number of counterparties holding certificates of deposit is usually somewhat larger since the outstanding certificates of deposits are typically distributed among 50-60 counterparties. The limited number of counterparties in the market operations is fully sufficient to ensure the transmission of Danmarks Nationalbank's interest-rate changes and to provide liquidity to the entire banking sector.

Danmarks Nationalbank's group of counterparties to foreign-exchange transactions is determined as required, depending on market conditions. Significant market activity under the given foreign-exchange conditions and a capacity to handle payments via the international financial network, SWIFT, are the key requirements for Danmarks Nationalbank's counterparties in the foreign-exchange market for Danish kroner.

1.4 THE MONETARY-POLICY INSTRUMENTS IN DENMARK COMPARED TO THOSE OF THE EUROSISTEM

The Eurosystem comprises the ECB and the national central banks in the euro area. Danmarks Nationalbank's monetary-policy instruments resemble those of the Eurosystem in a number of ways. There are some differences, however, most of which are related to the fixed-exchange-rate policy. Box 1.9 provides a summary overview of the overall operational framework for the Eurosystem's monetary policy.

The Eurosystem comprises the ECB and the national central banks in the euro area. The Eurosystem's provision of liquidity to the banking sector takes place mainly via weekly main refinancing operations, conducted as tenders for bids via the national central banks in the euro area. Liquidity is granted as loans against collateral in securities, and the loans have a maturity of two weeks. The Eurosystem also provides liquidity via long-term refinancing operations conducted as monthly tenders for liquidity with a maturity of three months. In addition, the Eurosystem may apply fine-tuning refinancing operations to smooth out interest-rate fluctuations, particularly if the interest-rate fluctuations are caused by unexpected liquidity fluctuations. Finally, the Eurosystem may also conduct structural refinancing operations in order to adjust its net position vis-à-vis the financial sector over a longer period.

The standing facilities of the Eurosystem are aimed at providing and absorbing liquidity on an overnight basis. The monetary-policy counterparties, comprising credit institutions in the euro area, can at their own initiative use the marginal lending facility to obtain overnight liquidity against collateral, and the deposit facility to make overnight deposits. The rate of interest on the marginal lending facility is higher than the rate of interest at which liquidity is allotted in the weekly main refinancing operations, while the rate of interest for the deposit facility is lower than the rate of interest in the market operations. The rates of interest on the standing facilities are normally the limits (a corridor of 2 percentage points) for the overnight interest rate in the euro area (EONIA).

The Eurosystem's minimum reserve system imposes an obligation on credit institutions in the euro area to deposit an amount corresponding to 2 per cent of selected liabilities with the national central banks. The reserve requirement must be met on average over a reserve maintenance period of one month, normally running from the 24th of one calendar month to the 23rd of the following calendar month. The required reserves accrue interest at the average marginal rate in the main refinancing operations during the reserve maintenance period.

In January 2003 the ECB announced that the maturity of the main refinancing operations will be shortened from two weeks to one week during the 1st quarter of 2004, cf. ECB (2003). At the same time, the timing of the reserve maintenance period will be changed so that it will always start on the settlement day of the main refinancing operation following the Governing Council meeting at which the monthly assessment of the monetary policy stance is pre-scheduled. Furthermore, as a rule, the implementation of changes to the standing-facility rates will be aligned with the start of the new reserve maintenance period (unlike today, when changes in the standing-facility rates take effect on the day after their announcement).

See ECB (2001 and 2002) and Abildgren (2002) for a more detailed description of the monetary-policy instruments in the euro area.

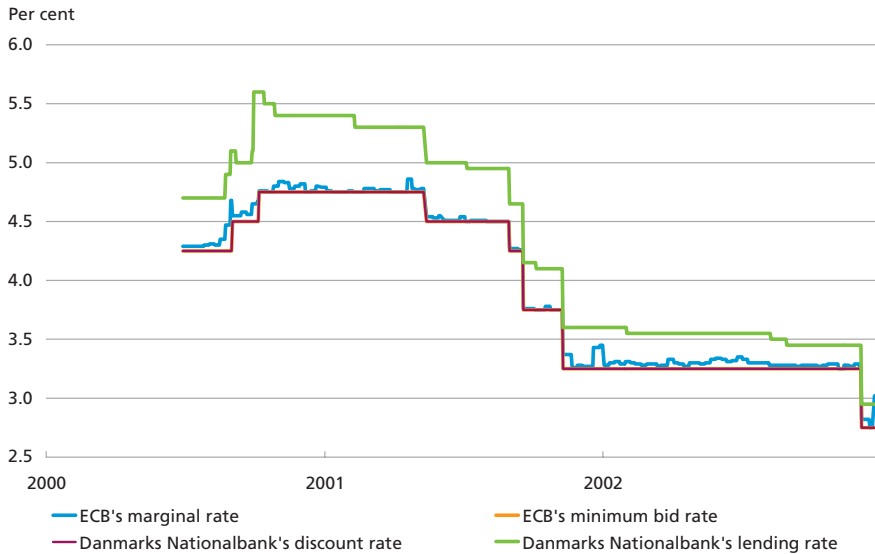
One of the differences between Denmark's Nationalbank's instruments and those of the Eurosystem is that the latter's monetary-policy counterparties have access to a marginal lending facility. At their own initiative the counterparties may use this facility to obtain overnight liquidity against collateral. Denmark's Nationalbank's monetary-policy counter-

parties do not have access to an overnight lending facility. This means for instance that the overnight interest rate in the Danish money market may increase significantly in periods of unrest in the foreign-exchange market without changes in the monetary-policy interest rates. In certain situations such an increase in the overnight interest rate may help to dampen the unrest in the foreign-exchange market. The absence of such a facility may also help to support an efficient money market, since the counterparties are obliged to trade liquidity among themselves instead of borrowing from Danmarks Nationalbank.

Secondly, the Eurosystem employs reserve requirements in the monetary policy. The Eurosystem's minimum reserve system imposes an obligation on credit institutions in the euro area to hold certain minimum balances with their national central banks. The reserve requirements must be met on average over a period of one month. The required reserves accrue interest at the average marginal rate for the main refinancing operations in the reserve maintenance period. The minimum reserve system serves two purposes: firstly, it helps to stabilise the overnight interest rate since the counterparties have an incentive to lend liquidity in the market when the overnight interest rate exceeds the rate of interest on required reserves. On the other hand, the counterparties have an incentive to maintain ample reserves in the periods when the overnight interest rate is below the rate of interest on required reserves. Secondly, the minimum reserve system helps to ensure that the counterparties remain in a structural liquidity deficit vis-à-vis the Eurosystem, which is assumed to enhance the transmission of the monetary-policy interest rates to the market interest rates.

In Denmark the current-account-limit system imposes a ceiling on current-account deposits. Such a ceiling is not compatible with a minimum reserve system as applied by the Eurosystem. Danmarks Nationalbank has also traditionally attached less importance to reducing fluctuation (volatility) in the overnight interest rate, since the volatility does not impact money-market interest rates for longer maturities. In addition, the sign preceding the counterparties' net position has no monetary-policy significance in Denmark due to the inherent symmetry in the conditions for monetary-policy loans and certificates of deposit. This is important as the sign of the net position may shift from time to time, particularly as a result of Danmarks Nationalbank's purchase and sale of foreign exchange.

Thirdly, the Eurosystem conducts its refinancing operations as tenders. In this way it is possible to manage the amount of liquidity provided to the banking system. Danmarks Nationalbank does not usually conduct tenders when granting monetary-policy loans. Instead, it determines a 14-



Note: Throughout the period shown, Danmarks Nationalbank's discount rate has corresponded to the ECB's minimum bid rate, so that the two curves overlap.

Source: ECB and Danmarks Nationalbank.

day interest rate at which the counterparties themselves can determine the volume of monetary-policy loans and placement in certificates of deposit (an "open window"). This is a simple and transparent way of providing liquidity and managing interest rates when no other considerations are to be taken into account (e.g. managing the amount of liquidity provided to the counterparties).

In the period from 28 June 2000 to date (early June 2003) the Euro-system's main refinancing operations have been conducted as variable-rate tenders in which the counterparties submit bids for both interest rates and amounts. Bids at the highest interest rate are satisfied first, and the bid rate applies. The ECB successively accepts bids at lower rates until the desired amount has been allotted. The lowest rate at which liquidity is allotted is known as the marginal rate, and liquidity may be allotted on a pro-rata basis at this rate (i.e. the individual counterparty is granted liquidity on the basis of the size of its bid at the marginal rate as a ratio of the total amount bid at the marginal rate). Prior to the variable-rate tenders the Governing Council of the ECB announces a minimum bid rate which is the lowest rate at which bids from the counterparties will be accepted. The minimum bid rate is the ECB's key monetary-policy interest rate.

Danmarks Nationalbank's monetary-policy interest rates are normally changed in step with the ECB's minimum bid rate, cf. Chart 1.9. Small or temporary movements in the ECB's marginal rate will not usually lead to

MAIN ITEMS OF DANMARKS NATIONALBANK'S BALANCE SHEET, END-2002		Table 1.1	
Assets	Kr. billion	Liabilities	Kr. billion
		Balance of the central	
Portfolio of domestic bonds	41.0	government's account	50.3
Foreign-exchange reserve	193.2	Net position	89.6
Other	3.1	Banknotes and coins in circulation	47.7
		Net capital	49.7

Note: The "other" item on the asset side comprises other assets less other liabilities.

Danmarks Nationalbank's net balance with the monetary-policy counterparties (the net position) is shown as a liability on the balance sheet. If the counterparties have a (net) debt, the net position is negative.

Source: Danmarks Nationalbank, Report and Accounts 2002.

changes in Danmarks Nationalbank's lending rate, but will result in minor fluctuations in the spread between the ECB's marginal rate and Danmarks Nationalbank's lending rate.¹

1.5 DANMARKS NATIONALBANK'S BALANCE SHEET

Danmarks Nationalbank's activities are reflected in the composition of assets and liabilities on its balance sheet, cf. Table 1.1.

Danmarks Nationalbank's primary tasks are to issue banknotes and coins and to conduct monetary and foreign-exchange policy. A derived effect is that Danmarks Nationalbank has claims in kroner and in foreign exchange. Consequently, Danmarks Nationalbank cannot avoid incurring a number of financial risks that affect its financial result, primarily the risk of losses due to fluctuations in interest and exchange rates in the Danish and international financial markets. It is important for a central bank to ensure absolute confidence in its solvency so that revenue considerations do not curtail its ability to conduct monetary and foreign-exchange policy. Its net capital must therefore be significant in relation to its balance sheet and activities, and consolidation should take place on an ongoing basis.

Danmarks Nationalbank's profit after allocations to reserves is payable to the central government. In 2002 the profit paid to the central government amounted to kr. 3.6 billion. At end-2002 Danmarks Nationalbank's net capital was approximately kr. 50 billion.²

¹ In the summer and autumn of 2000 Danmarks Nationalbank adjusted its lending rate, however, when the marginal rate for the ECB's main refinancing operations systematically changed in relation to the minimum bid rate. In this period the market participants generally expected interest rates to increase. The changes which the ECB plans to introduce during the 1st quarter of 2004, cf. Box 1.9, are expected to reduce the impact of interest-rate expectations on bidding at the ECB's auctions, cf. ECB (2003).

² The profit for 2002 was allocated according to the following principles: positive value adjustments are allocated to the Value Adjustment Reserve. Negative value adjustments are covered from the Value Adjustment Reserve, if possible. After allocation to/from the Value Adjustment Reserve, 20 per cent of the resulting profit is allocated to the General Reserves for consolidation purposes. The remaining 80 per cent of the profit is payable to the central government. Danmarks Nationalbank's accounts and risk management are described in more detail in Hansen and Ølgaard (2000) and in Danmarks Nationalbank, Report and Accounts.

In addition to krone-denominated transactions with the monetary-policy counterparties, Danmarks Nationalbank's balance sheet is primarily affected by transactions related to Danmarks Nationalbank's role as banker to the central government and to the purchase and sale of foreign exchange in the market. The following sections elaborate on the individual items of Danmarks Nationalbank's balance sheet and their relation to the monetary and foreign-exchange policy.

1.5.1 NET POSITION VIS-À-VIS DANMARKS NATIONALBANK

The net position vis-à-vis Danmarks Nationalbank is the term used for Danmarks Nationalbank's net balance with banks and mortgage-credit institutes – the monetary-policy counterparties – in relation to the monetary-policy instruments. The net position is calculated as the counterparties' current-account deposits as well as placements in certificates of deposit, less monetary-policy loans from Danmarks Nationalbank. Bonds in Danmarks Nationalbank's portfolio are not included in the net position even though they are issued by e.g. a mortgage-credit institute which is a monetary-policy counterparty. Nor are the counterparties' holdings of banknotes and coins included in the net position. This reflects that neither Danmarks Nationalbank's portfolio of mortgage-credit bonds nor variations in the circulation of banknotes and coins are any longer of significance to the monetary policy, cf. Sections 1.5.4 and 1.5.5.

All other items of a central bank's balance sheet – i.e. all items except the net position – are usually referred to as "autonomous items". In numeric terms, the autonomous items on a central bank's balance sheet exactly correspond to the monetary-policy counterparties' net position vis-à-vis the central bank. Changes in the autonomous items are therefore reflected in equivalent changes in the net position. In Danmarks Nationalbank's case this relationship is best illustrated by a few examples.

When Danmarks Nationalbank needs to support the exchange rate of the krone, it purchases kroner from e.g. a bank against payment in foreign exchange. This transaction reduces the foreign-exchange reserve and the net position, cf. Table 1.2.

Another example is a central-government payroll disbursement. This reduces the balance of the central government's account and is offset by an increase in the net position, cf. Table 1.3.

Not all Danmarks Nationalbank's transactions have an impact on the net position. For instance, foreign-exchange transactions with the central government do not affect the net position. When the central govern-

IMPACT ON DANMARKS NATIONALBANK'S BALANCE SHEET OF SALE OF FOREIGN EXCHANGE FOR KR. 1 BILLION

Table 1.2

Assets	Kr. billion	Liabilities	Kr. billion
Portfolio of domestic bonds		Balance of the central government's account	
Foreign-exchange reserve	-1	Net position	-1
Other		Banknotes and coins in circulation	
		Net capital	

IMPACT ON DANMARKS NATIONALBANK'S BALANCE SHEET OF A CENTRAL-GOVERNMENT PAYROLL DISBURSEMENT OF KR. 1 BILLION

Table 1.3

Assets	Kr. billion	Liabilities	Kr. billion
Portfolio of domestic bonds		Balance of the central government's account	-1
Foreign-exchange reserve		Net position	+1
Other		Banknotes and coins in circulation	
		Net capital	

IMPACT ON DANMARKS NATIONALBANK'S BALANCE SHEET OF A CENTRAL-GOVERNMENT LOAN IN FOREIGN EXCHANGE OF KR. 1 BILLION

Table 1.4

Assets	Kr. billion	Liabilities	Kr. billion
Portfolio of domestic bonds		Balance of the central government's account	+1
Foreign-exchange reserve	+1	Net position	
Other		Banknotes and coins in circulation	
		Net capital	

Note: Se table 1.1.

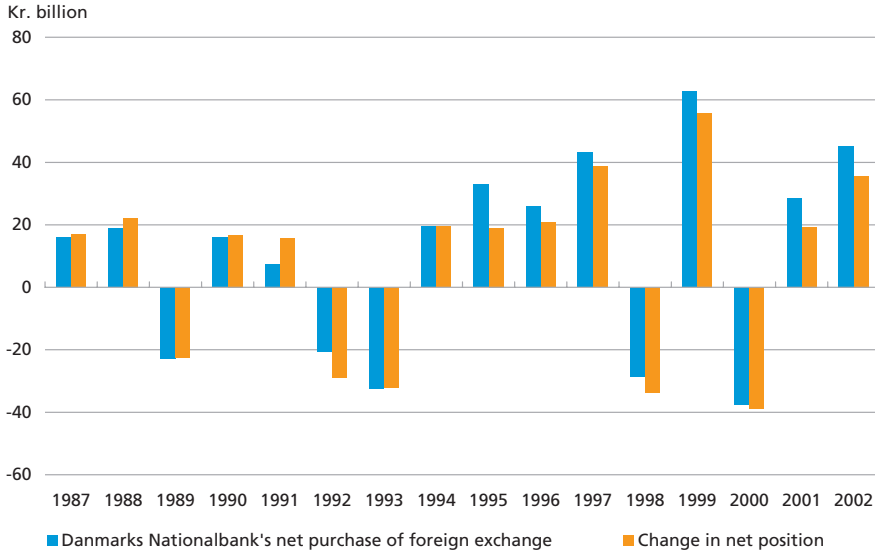
ment raises foreign loans, Danmarks Nationalbank exchanges the central government's loan proceeds in foreign exchange for kroner. Hereby only the central government's deposit with Danmarks Nationalbank and the foreign-exchange reserve will increase, cf. Table 1.4.

The net position comprises the monetary-policy counterparties' balance with Danmarks Nationalbank. Interest is accrued at the monetary-policy interest rates. Over longer periods the net position is especially influenced by Danmarks Nationalbank's net purchases of foreign exchange.

In the longer term the net position is especially influenced by Danmarks Nationalbank's net purchases of foreign exchange. The central government's net payments in kroner result in large fluctuations within the individual year, but are of minor significance in the longer term, cf. Section 1.5.2. Fluctuations in the net position due to other autonomous

CHANGE IN NET POSITION AND NET PURCHASE OF FOREIGN EXCHANGE

Chart 1.10



Source: Danmarks Nationalbank.

items are usually small. The relationship between the net position and Danmarks Nationalbank's purchase of foreign exchange is illustrated in Chart 1.10.

1.5.2 THE GOVERNMENT'S ACCOUNT AT DANMARKS NATIONALBANK

Danmarks Nationalbank is the main banker to the Danish central government, and the central government holds a current account at Danmarks Nationalbank. Deposits to the central government's account accrue interest at the discount rate. The account holds the central government's liquid funds and is used to settle large central-government payments. Other public authorities (municipalities and counties) do not hold accounts at Danmarks Nationalbank – their ingoing and outgoing payments are handled via commercial banks.

The central government's outgoing retail payments are outsourced to the banking sector, so that Danmarks Nationalbank pays out an aggregated sum to a bank, which handles the further distribution of the funds. Ingoing payments to the central government – e.g. VAT – are typically also handled by banks, which then transfer the funds to Danmarks Nationalbank.

Under an agreement with the Ministry of Finance, Danmarks Nationalbank undertakes all functions related to raising and managing the

THE GOVERNMENT BORROWING NORM

Box 1.10

The central-government borrowing norm sets out the framework for the distribution and scope of the central government's domestic and foreign borrowing. There are norms for both domestic and foreign borrowing:

- The domestic norm states that domestic borrowing in kroner during a given fiscal year normally covers the central government's gross domestic financing requirement, i.e. the central government's current deficit and redemptions on the domestic debt. Uncertainty concerning the balance of the central government's account around the turn of the year may entail that the central government's financing in one calendar year exceeds the borrowing requirement, in order to allow the loan proceeds to serve as an extra buffer on the account. In the light of e.g. market conditions the central government may also continue to issue government securities, even though the borrowing requirement for the year has been financed. In that case, these issues will cover part of the borrowing requirement for the following year.
- The norm for foreign borrowing implies that redemptions on the foreign debt are normally refinanced by new foreign loans. The purpose of the central government's foreign borrowing is to maintain an adequate foreign-exchange reserve. Deviations from the norm for foreign borrowing may therefore occur in situations where the foreign-exchange reserve either decreases or increases more than is found appropriate. If the foreign-exchange reserve decreases more than is considered desirable, the central government will raise loans abroad. If the foreign-exchange reserve increases more than is considered necessary, the norm for foreign borrowing can be reduced if the balance of the central government's account makes this possible. Moreover, the foreign borrowing requirement may be redistributed between different years in order to ensure appropriate planning of borrowing.

The framework for the central-government borrowing was agreed between the government and Danmarks Nationalbank in 1993. The agreement concretised the existing practice, since the domestic norm has more or less been in operation since the early 1980s. The domestic norm – as well as the fact that over longer periods Danmarks Nationalbank usually purchases foreign exchange in the market to cover the central government's current net foreign-exchange expenditure (e.g. interest payments on the central government's foreign-exchange debt) – ensures that the central government's payments seen over the entire year have practically no impact on domestic liquidity (i.e. the net position of the monetary-policy counterparties vis-à-vis Danmarks Nationalbank). The norm is thus an important element in distinguishing between fiscal policy on the one hand and monetary policy on the other hand.

central-government debt.¹ Even though the central government holds an account at Danmarks Nationalbank, it does not borrow from Danmarks Nationalbank. Central-government borrowing is structured so as

¹ The central government's domestic and foreign borrowing is described in Danmarks Nationalbank's annual publication "Danish Government Borrowing and Debt".

to ensure adequate funds on the central government's account to absorb the significant daily fluctuations in ingoing and outgoing central-government payments. If there is a risk that the central government's account will be overdrawn, the central government raises a loan on market terms, and the proceeds are credited to the central government's account. The Treaty Establishing the European Community prohibits credit facilities with the central bank in favour of the central government in order to avoid monetary financing of government deficits. The Treaty also prohibits the purchase of government securities directly from the central government by the central bank.

In Denmark a framework for raising central-government loans has furthermore been established in the form of a "norm", cf. Box 1.10. In overall terms the agreement states that the central government's krone-denominated borrowing normally covers the central government's gross domestic financing requirement, i.e. the central government's current deficit and redemptions on the domestic debt, for a given fiscal year. The norm ensures that the central government's payments have virtually no impact on the liquidity situation of the monetary-policy counterparties over the entire year.

Chart 1.11 shows the development in the central government's deposits with Danmarks Nationalbank at year-end. The large increase in 1993 reflects substantial short-term foreign loans to safeguard the foreign-exchange reserve in connection with the currency unrest in 1993.

Within each year there are temporary fluctuations in the liquidity effect from the central government due to time lags between the central government's gross domestic financing requirement and its krone-denominated borrowing.

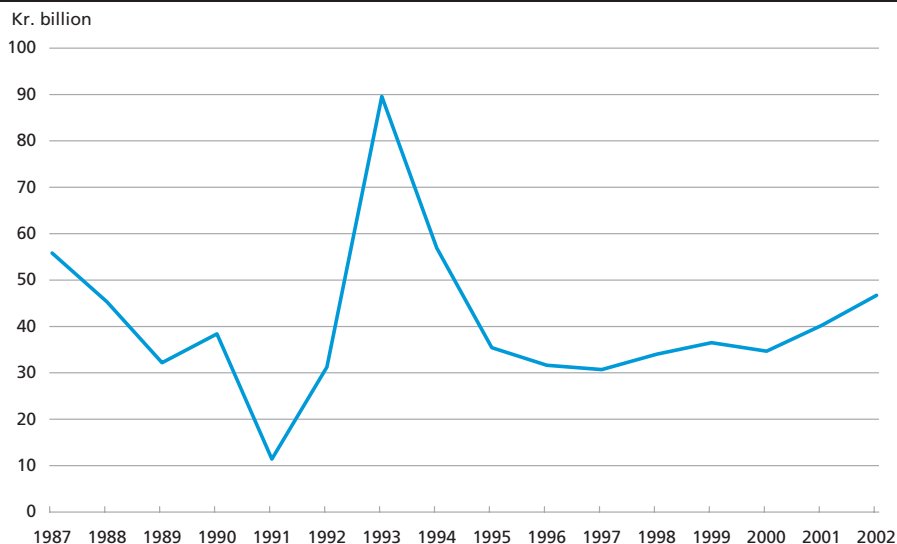
Danmarks Nationalbank is banker to the Danish central government.
Danmarks Nationalbank may not grant loans to the central government.

On Danmarks Nationalbank's balance sheet fluctuations in central-government payments are reflected in the central government's balance and in the net position. Chart 1.12 shows the payments to and from the central government's account, excluding movements related to the central government's foreign debt. It is seen that the liquidity effect fluctuates considerably, e.g. in 2002 from liquidity absorption of around kr. 15 billion in February to liquidity expansion of around kr. 20 billion in March.

Changes in the central government's foreign debt have no impact on the net position, but on Danmarks Nationalbank's foreign-exchange

THE BALANCE OF THE CENTRAL GOVERNMENT'S ACCOUNT AT DANMARKS NATIONALBANK, YEAR-END

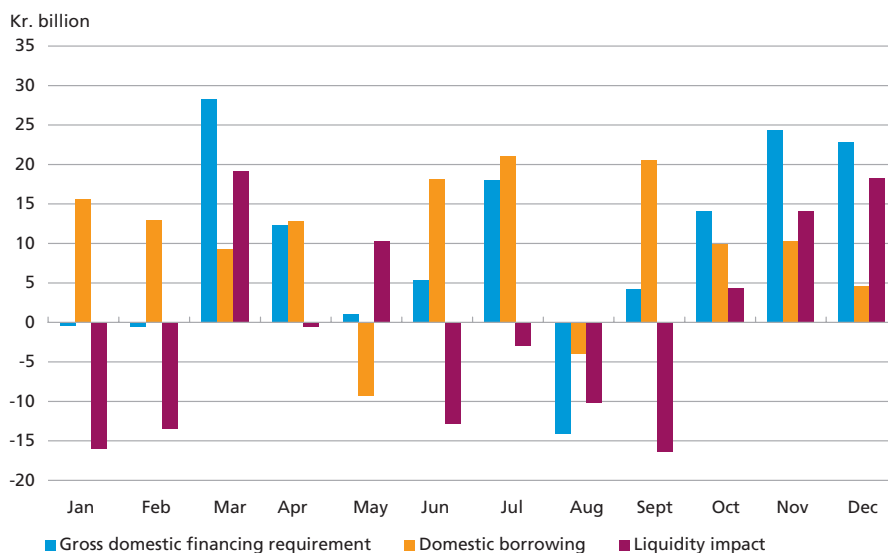
Chart 1.11



Source: Monthly balance sheets for Danmarks Nationalbank.

THE CENTRAL GOVERNMENT'S LIQUIDITY IMPACT IN 2002

Chart 1.12



Note: The gross domestic financing requirement is calculated as the value in kroner of the central government's current net disbursements plus redemptions on the government domestic debt and the net bond purchases of the Social Pension Fund.

In the Chart the liquidity impact is calculated as the difference between the gross domestic financing requirement and domestic borrowing. It is thus not taken into account that some of the central government's current revenue and expenditure (e.g. interest payments on the government's foreign debt, aid to developing countries, VAT contributions to the EU, receipts under the EU's Common Agricultural Policy and allocation of profit from Danmarks Nationalbank to the central government) do not affect liquidity in kroner.

Source: Danmarks Nationalbank.

reserve. Changes in the central government's foreign debt are the dominant reason for fluctuations in the central government's balance with Danmarks Nationalbank over a number of years.

1.5.3 THE FOREIGN-EXCHANGE RESERVE

The foreign-exchange reserve is an asset on Danmarks Nationalbank's balance sheet. The foreign-exchange reserve consists of secure and liquid assets that are mainly deposits with foreign banks and foreign securities that can quickly be sold or pledged as collateral should the need arise.¹ In addition, Danmarks Nationalbank's gold stock is also included in the foreign-exchange reserve, cf. Box 1.11.

The foreign-exchange reserve is an asset on Danmarks Nationalbank's balance sheet. Purchase and sale of foreign exchange (intervention) supports the fixed-exchange-rate policy.

The primary purpose of the foreign-exchange reserve is to allow Danmarks Nationalbank to intervene rapidly in the foreign-exchange market at its own initiative if required. By intervening, i.e. purchasing or selling foreign exchange against kroner, Danmarks Nationalbank can influence the krone rate – at least in the short term. When foreign exchange is sold, the krone is strengthened, while purchase of foreign exchange will weaken the krone. The foreign-exchange reserve serves as a buffer against undesirable fluctuations in the krone rate. In addition, the size of the foreign-exchange reserve has a signal value which may prevent any speculation from arising.

The foreign-exchange reserve does not constitute an upper limit for Danmarks Nationalbank's intervention capacity:

- Denmark's participation in ERM II entails a mutual obligation for Danmarks Nationalbank and the ECB to intervene if the agreed fluctuation limits for the krone are reached. If the krone reaches its limit vis-à-vis the euro, unlimited intervention credit may be granted within the framework of ERM II, cf. Section 1.2.
- The central government may raise additional foreign loans at short notice, thereby increasing the foreign-exchange reserve. For instance, the central government has access to considerable short-term loan programmes in foreign exchange (the Commercial Paper programmes). The programmes function as overdraft facilities in foreign exchange and have been used on several occasions.

¹ For a more detailed description of the foreign-exchange reserve, see Jensen (1999).

DANMARKS NATIONALBANK'S GOLD STOCK AND LENDING OF GOLD

Box 1.11

Historically gold has played a key role in the monetary systems of many countries. The encashment of banknotes issued by Danmarks Nationalbank against gold bars was suspended in 1931.

Under the Danmarks Nationalbank Act of 1936 a gold fund shall cover at least 25 per cent of the total active banknote circulation. Since 1939 the Board of Directors of Danmarks Nationalbank, with the consent of the Royal Bank Commissioner (currently the Minister for Economic and Business Affairs), has granted exemptions from the gold-coverage requirement on an ongoing basis, and gold has had its day in relation to the issue of banknotes in Denmark, as in other countries. Nowadays Danmarks Nationalbank's gold stock is of significance only to the foreign-exchange reserve.

At end-2002 Danmarks Nationalbank held approximately 66,600 kilos of gold at a total market value of kr. 5.2 billion. Most of the gold is deposited with the Bank of England. The yield on the gold stock comprises any increases in value over time as a result of higher gold prices. In order to supplement this with a regular yield on the gold stock, Danmarks Nationalbank began to lend gold in 1987.

In the international gold-lending market, central banks lend gold to commercial banks for e.g. 3 or 6 months. In this way the central banks gain revenue in the form of gold interest. The commercial banks relend the gold, e.g. to gold producers who wish to safeguard themselves against future price decreases. For instance, if a gold producer in May wishes to safeguard itself against a price fall on the August production, the gold producer can in May choose to borrow gold from a commercial bank for 3 months against payment of gold interest. In May the gold producer sells the borrowed gold in the spot market and places the proceeds at 3 months' interest. In August the gold producer realises its placement and returns gold (stemming from the August production) to the commercial bank. Overall the gold producer has thereby sold its August production of gold at the May gold price. Lending thus depends on the expectations concerning future prices, as well as the rate of interest. At end-2002 just over half of Danmarks Nationalbank's gold was lent to banks with high credit ratings.

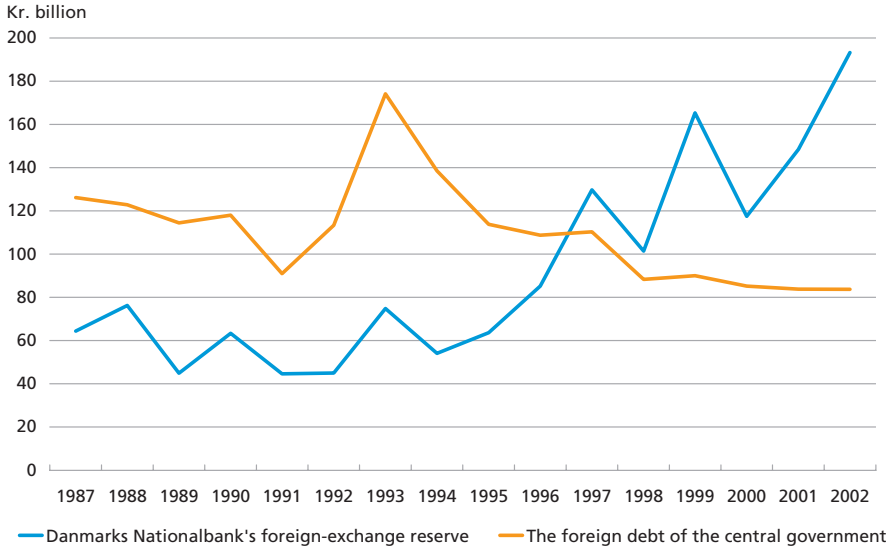
The historical and current roles of gold in the monetary system are elaborated on in Bie and Pedersen (1999).

- In principle Danmarks Nationalbank may also purchase or sell foreign exchange against kroner on forward terms. Operations in the forward currency market do not have immediate liquidity effects, but affect the foreign-exchange reserve and the net position at the time of settlement of the contract. Danmarks Nationalbank has not used intervention in the forward market for many years.

Changes in the foreign-exchange reserve stem primarily from two sources, i.e. the raising of government loans and Danmarks Nationalbank's purchases of foreign exchange, as well as adjustments to the foreign-exchange reserve to reflect changes in stock-exchange prices and exchange rates. Chart 1.13 shows the development in the foreign-exchange reserve and the central government's foreign debt since 1987.

THE FOREIGN-EXCHANGE RESERVE AND THE CENTRAL GOVERNMENT'S FOREIGN DEBT, YEAR-END

Chart 1.13



Note: The government's foreign debt comprises the central government's debt in foreign exchange and thus does not include non-residents' portfolios of krone-denominated bonds issued by the central government.

Source: Danmarks Nationalbank.

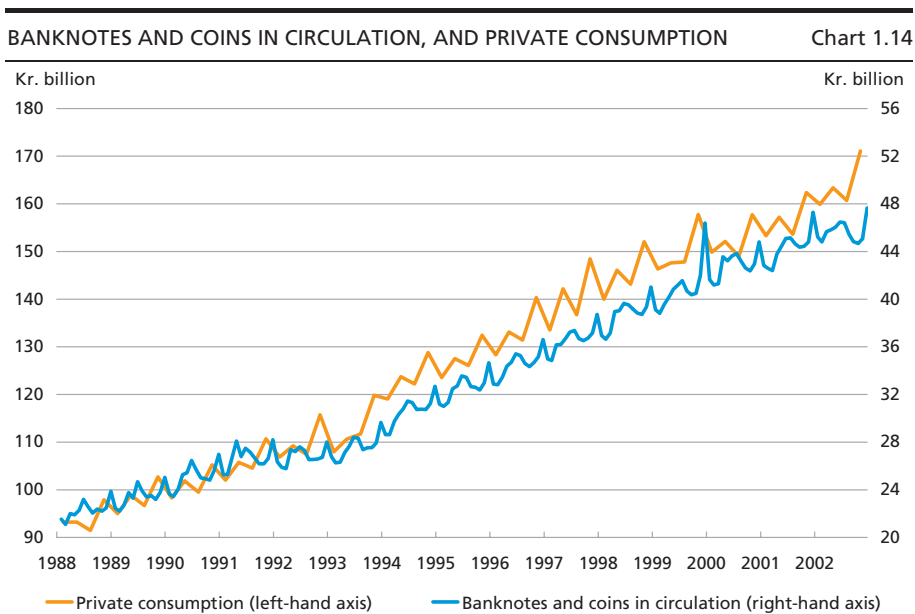
1.5.4 THE PORTFOLIO OF DOMESTIC BONDS

Previously, e.g. in the 1960s, Danmarks Nationalbank's purchase and sale of krone-denominated bonds in the market was considered to be an important monetary-policy instrument for influencing bond yields and economic activity.

In view of today's free movement of capital such operations are not considered effective in influencing long-term yields, cf. Chapter 3. Consequently the portfolio of domestic bonds is not used as a monetary-policy instrument. Monetary policy is arranged to manage the short-term money-market interest rates with a view to maintaining a stable krone vis-à-vis the euro. Danmarks Nationalbank's bond portfolio is thus a portfolio of investment securities.¹

Today purchase and sale of bonds from Danmarks Nationalbank's portfolio of domestic bonds is not an element of monetary policy.

¹ For a more detailed description of the portfolio of domestic bonds, see Jayaswal (2003).



Note: Nominal, non-seasonally-adjusted values. Private consumption is calculated on a quarterly basis, while the circulation of banknotes and coins is calculated on a monthly basis (month-end).

Source: Statistics Denmark and Danmarks Nationalbank.

1.5.5 BANKNOTES AND COINS IN CIRCULATION

Banknotes and coins in circulation are important liabilities on Danmarks Nationalbank's balance sheet, but in terms of monetary policy variations in circulating banknotes and coins are of no significance, cf. also Chapter 4.

The circulation of banknotes and coins as means of payment is affected primarily by the scale of private consumption, but banknotes are also used for savings purposes to some extent. Danmarks Nationalbank adjusts the volume of banknotes and coins in circulation to the citizens' demand. The development in the circulation is normally rather stable from year to year, but there are seasonal fluctuations within each year, cf. Chart 1.14.

Over time the circulation of banknotes and coins has increased in step with private consumption despite the more widespread use of electronic payment methods, e.g. via the Dankort (debit card). At end-2002, banknotes and coins in circulation amounted to approximately kr. 48 billion, equivalent to around kr. 9,000 per citizen.

Variation in the volume of banknotes and coins in circulation is of no monetary-policy significance.

IMPACT ON DANMARKS NATIONALBANK'S BALANCE SHEET OF AN INCREASE IN BANKNOTES AND COINS IN CIRCULATION BY KR. 1 BILLION

Table 1.5

Assets	Kr. billion	Liabilities	Kr. billion
Portfolio of domestic bonds		Balance of the central government's account	
Foreign-exchange reserve		Net position	-1
Other		Banknotes and coins in circulation	+1
		Net capital	

Note: The "other" item on the asset side comprises other assets less other liabilities.

Danmarks Nationalbank's net balance with the monetary-policy counterparties (the net position) is shown as a liability on the balance sheet.

Banknotes and coins are put into circulation via the banks, which obtain them from Danmarks Nationalbank, so that citizens' cash requirements can be met. An increase in circulation is offset by a decrease in the net position, cf. Table 1.5.

The circulation of banknotes and coins can be seen as a non-interest-bearing deposit with Danmarks Nationalbank, whereas the monetary-policy counterparties' net position bears interest. After deduction of costs of production and distribution, banknotes and coins are therefore a significant source of income for Danmarks Nationalbank. This income is known as seigniorage.¹

1.6 INSTRUMENTS AND INTERVENTION IN THE FOREIGN-EXCHANGE MARKET

Danmarks Nationalbank operates in the foreign-exchange market for the following reasons:

- Danmarks Nationalbank purchases and sells kroner against foreign exchange in connection with intervention to stabilise the krone vis-à-vis the euro. This is a direct consequence of the fixed-exchange-rate policy.
- Part of Danmarks Nationalbank's purchase and sale of kroner against foreign exchange is related to its role as banker to the central government, in which capacity it effects payments related to central-government debt in foreign exchange and other central-government foreign-exchange transactions (e.g. central-government foreign-exchange disbursements as aid to developing countries or receipts under the EU's Common Agricultural Policy). When the central government receives foreign exchange, e.g. when raising a foreign-exchange loan, Danmarks Nationalbank purchases the foreign-exchange proceeds,

¹ The cash supply and the significance of banknotes and coins in circulation to Danmarks Nationalbank's revenue is considered in Pedersen and Wagener (1996 and 2000) and Wagener (1998).

which then become part of the foreign-exchange reserve. The equivalent amount in kroner is credited to the central government's account at Danmarks Nationalbank. Likewise, when the government effects payments in foreign exchange, e.g. interest and redemptions on its foreign debt, the central government purchases the required foreign exchange from Danmarks Nationalbank, cf. Section 1.5.2.

- Finally, Danmarks Nationalbank undertakes transactions (not involving kroner) in the foreign-exchange market in connection with its management of the foreign-exchange reserve. In view of the fixed-exchange-rate policy vis-à-vis the euro the foreign-exchange reserve is primarily exposed in euro. The part of the reserve that is not placed directly in euro-denominated bonds or bank deposits has by and large been converted into euro via forward contracts.¹ Consequently Danmarks Nationalbank makes transactions in the foreign-exchange market.

Danmarks Nationalbank intervenes in the foreign-exchange market to stabilise the krone in the short term, cf. Section 1.2. If, for instance, there is a tendency for the krone to weaken in the foreign-exchange market, Danmarks Nationalbank may sell foreign exchange and purchase kroner in order to counteract this tendency. When Danmarks Nationalbank sells foreign exchange and purchases kroner, the krone will tend to strengthen due to Danmarks Nationalbank's impact on the demand for kroner. By intervening Danmarks Nationalbank furthermore signals its willingness to defend the krone rate, which may also impact on the supply and demand of kroner in the market.

Within the framework of ERM II a distinction is made between two types of intervention.

Intramarginal intervention takes place when the krone rate vis-à-vis the euro is within the fluctuation band of ± 2.25 per cent around the central rate. In the period from the launch of ERM II in 1999 and to date (early June 2003) only Danmarks Nationalbank has conducted intramarginal intervention. The ERM II agreement does, however, allow Danmarks Nationalbank and the ECB to conduct coordinated intramarginal intervention.

Intervention at the margin takes place if the krone rate vis-à-vis the euro reaches the upper or lower limit of the fluctuation band around the central rate. In this case both Danmarks Nationalbank and the ECB have an obligation to intervene. The ECB and Danmarks Nationalbank may, however, suspend intervention if this is in conflict with the primary

¹ At end-2002 Danmarks Nationalbank's foreign-exchange reserve, in addition to euro, included positions in US dollars, pounds sterling and Swedish kronor, of which virtually all had been converted to euro via forward contracts.

monetary-policy objective. Since the krone has remained close to its central rate throughout the lifetime of ERM II to date (early June 2003), intervention at the margin has not yet been necessary.

A well-functioning system has been established with prior approval of intervention within the framework of ERM II. The prior acceptance of the ECB is required when Danmarks Nationalbank wishes to conduct intramarginal foreign-exchange transactions in euro for amounts exceeding the agreed limits. Likewise, the ECB must obtain the prior acceptance of Danmarks Nationalbank if it wishes to undertake foreign-exchange transactions in kroner above an agreed amount.

As stated in Section 1.2, Danmarks Nationalbank operates with both intervention and interest-rate changes in its management of the krone rate. Whether to intervene and/or change the monetary-policy interest rates are independent decisions, since intervention and interest-rate changes may be applied independently of each other. If there is e.g. a tendency for the krone to weaken, Danmarks Nationalbank normally opts for one or several of the following:

- No reaction. The krone rate and/or the market interest rates absorb the adjustment.
- Intervention. Danmarks Nationalbank sells foreign exchange against kroner to counteract the weakening of the krone.
- Raising the monetary-policy interest rates. This will tend to strengthen the krone.

Changes in the monetary-policy interest rates and intervention may thus to some extent substitute each other in relation to management of the krone rate. Isolated intervention primarily takes place in order to absorb minor or temporary fluctuations in the krone rate. In connection with a prolonged inflow or outflow of foreign exchange – with no actual pressure on the krone – the intervention is normally supplemented with minor fine-tuning interest-rate changes, e.g. in the range of 0.05 per cent. In the event of a sustained large outflow of foreign exchange and pressure on the krone Danmarks Nationalbank will normally not only intervene, but also raise interest rates more significantly, e.g. by 0.25 or 0.5 per cent. Speculative attacks on the krone may lead to considerably higher interest-rate increases.

To some extent changes in the monetary-policy interest rates and purchase/sale of foreign exchange can be seen as substitutes in terms of managing the krone rate. However, to counteract sustained pressure, it is normally necessary to change the interest rate.

Danmarks Nationalbank's purchase and sale of foreign exchange will be reflected in the monetary-policy counterparties' net position vis-à-vis Danmarks Nationalbank, cf. Section 1.5. If Danmarks Nationalbank sells foreign exchange, the net position will decrease, while purchase of foreign exchange will increase the net position. In a fixed-exchange-rate regime the net position will therefore have a residual character. This can also be seen from the fact that Danmarks Nationalbank has no objective for the size of or sign preceding the monetary-policy counterparties' net position vis-à-vis Danmarks Nationalbank.

Due to the relationship between foreign-exchange intervention and the net position, intervention also influences Danmarks Nationalbank's use of its instruments.

For instance, if a foreign-exchange sale is settled at a time when Danmarks Nationalbank is not conducting regular market operations, the sale is reflected in lower current-account deposits when the payments are settled (normally 2 banking days after the trade day). In the event of major intervention an aggregate liquidity deficit may arise, and Danmarks Nationalbank will have to provide liquidity via extraordinary market operations to ensure that the aggregate current-account deposits do not fall below zero. This may be achieved by e.g. opening for buy-back of certificates of deposit.

On the other hand, purchase of foreign exchange may entail that the total current-account deposits approach the limit of around kr. 20 billion. In that case Danmarks Nationalbank will sell certificates of deposit so that the current-account limit is not exceeded, cf. Section 1.3.1.

In the weekly market operations the counterparties are free to distribute their net position on current-account deposits, certificates of deposit and monetary-policy loans within the framework of the current-account-limit system. In the longer term the actual size of the current-account deposit will therefore be independent of the intervention scope and correspond to the current-account deposit desired by the counterparties within the range of kr. 0-20 billion.

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APPENDIX 1.A: DANMARKS NATIONALBANK'S ROLE IN SETTLEMENT OF PAYMENTS IN DANISH KRONER

The Danish krone payment system is based on the banks, which handle the vast majority of all financial transactions in Denmark. A wide range of payments – e.g. payrolls, payments for goods and services by cheque or Dankort (debit card), purchases of securities, etc. – involve transfers between bank accounts.

The payments between participants in the payment system are to a large extent settled via accounts with Danmarks Nationalbank. Some payments are settled directly via the current accounts, while other types of payments are first collated and compiled (cleared) in a separate system outside Danmarks Nationalbank before they are settled via accounts with Danmarks Nationalbank.

Danmarks Nationalbank is the settlement bank for a number of systems, which are briefly outlined below. Table 1.A.1 provides an overview of the volume of transactions in the systems in 2002.

Kronos

Kronos is Danmarks Nationalbank's payment system whereby banks and a few other participants mutually exchange e.g. large payments (wholesale payments) such as money-market transactions and transfer of special-term deposits. Kronos is an RTGS (Real-Time Gross Settlement) system, i.e. each transaction is effected independently immediately after the transfer request has been submitted.

KRONER PAYMENTS	Table 1.A.1
	2002
Kronos	
Number of transactions, '000	366
Value of transactions, kr. billion	40,372
Average value per transaction, kr. '000	110,306
Sumclearing	
Number of transactions, '000	894,636
Value of transactions, kr. billion	4,111
Average value per transaction, kr. '000	5
VP System	
Number of trading transactions, '000	4,844
Value of trading transactions, kr. billion	24,287
Average value per transaction, kr. '000	5,014
FUTOP settlement	
Number of contracts, '000	537

Source: Danish Bankers Association, VP Securities Services, Copenhagen Stock Exchange and own calculations.

Participation in Kronos is compulsory for current-account holders at Danmarks Nationalbank. Kronos functions as the current-account holders' "home banking system" whereby they have direct access to their accounts at Danmarks Nationalbank via their own computer screens. A bank can thus manually transact online payment transfers from its own current account to other banks' current accounts with Danmarks Nationalbank.

Kronos is open for payments in Danish kroner between 7.00 a.m. and 4.30 p.m., except between 3.30 p.m. and 4.00 p.m. when the counterparties' accounts with Danmarks Nationalbank are settled at the start of a new monetary-policy day. However, in the period from 4.00 p.m. to 4.30 p.m. liquidity may only be transferred to settlement accounts for overnight settlement of payments related to securities registered with VP Securities Services or in connection with the Sumclearing.

For a detailed description of Kronos, see Angelius and Pedersen (2002).

The Sumclearing

The Sumclearing is a payment system whereby e.g. retail payments, including cheques, Dankort (debit card) transactions and transfers via BetalingsService (direct debit), are settled between the banks. The Sumclearing system, which is owned by the Danish Bankers Association and operated by PBS, is a netting system. This means that all payments to and from the individual participants are compiled (netted) into one payment, and the payments are subsequently settled via the participants' accounts with Danmarks Nationalbank.

Prior to settlement via Danmarks Nationalbank the banks transfer sufficient funds from their current accounts to their settlement accounts with Danmarks Nationalbank. Danmarks Nationalbank then reports the amounts to PBS, which handles the clearing (netting). PBS checks that net deficits in the clearing are within the reported amounts and submits the net statement to Danmarks Nationalbank. The latter enters the net items to the settlement accounts. The banks themselves book the underlying retail transactions after settlement of the net positions via Danmarks Nationalbank.

The VP System

The VP System is VP Securities Services' system for settling trades and other payments, e.g. interest and repayments, in connection with securities registered by VP.

Settlement takes place several times a day at fixed times when the participants' positions in respectively securities and money are calculated. Danmarks Nationalbank handles settlement of the monetary posi-

tions. In principle securities transactions are settled via withdrawal from the buyer's current account with Danmarks Nationalbank and registration of the purchase on the buyer's securities account at VP. Buyers who do not hold accounts with Danmarks Nationalbank settle via another account holder connected to VP. Monetary positions are settled simultaneously with the securities. This ensures that both money and securities are present. This is known as Delivery versus Payment or DvP.

Many international investors have deposited their Danish securities with Euroclear. Euroclear is connected to VP via a direct link that enables the transfer of the Danish securities between Euroclear and VP without loss of trading days (value days). The close coordination between VP's settlement cycle and Euroclear's makes it possible to transfer the same securities to and from Euroclear and VP several times during the same day.

FUTOP Clearing

The FUTOP Clearing Centre A/S settles trades in options and futures (derivatives) listed on the Copenhagen Stock Exchange. Derivatives trades are cleared via the Swedish derivatives system, while the participants' net monetary positions are settled by means of Kronos via accounts at Danmarks Nationalbank.

CLS

In September 2002 an international settlement system for currency trades, CLS (Continuous Linked Settlement) was established. The objective of CLS is to limit the settlement risks in relation to international currency trading.

CLS is a private banking company established and owned by the world's largest commercial foreign-exchange dealers. In CLS currency trades are settled according to the "payment versus payment" principle, whereby both parties to a currency trade must first pay their part of the trade into CLS before the payments are exchanged. In this way neither party incurs a settlement risk by paying its part of the trade without being certain of receiving payment from the counterparty.

At the beginning of 2003 currency trades could be settled in US, Australian and Canadian dollars, euro, Japanese yen, pounds sterling and Swiss francs. Danish and Norwegian kroner, Swedish kronor and Singapore dollars are expected to join CLS in the 2nd half of 2003. Ingoing and outgoing payments related to the currency trades settled in CLS are effected via the national payment systems of the participating currencies and booked to accounts with the central banks of the respective currencies. When the Danish krone joins CLS, the krone part of currency trades involving Danish kroner will be settled by means of Kronos via accounts with Danmarks Nationalbank.

APPENDIX 1.B: INFORMATION FROM DANMARKS NATIONALBANK

Danmarks Nationalbank regularly publishes a wide range of information of interest in the context of monetary and foreign-exchange policy, cf. the lists in Tables 1.B.a and b.

At 4.00 p.m. on banking days Danmarks Nationalbank publishes information on the net position at 3.30 p.m. on the same day and on the use of instruments. The content corresponds to Box B.1.

To assist the monetary-policy counterparties in their liquidity planning, Danmarks Nationalbank regularly issues forecasts of central-government payments. At the same time dates are published for Danmarks Nationalbank's planned purchase and sale of certificates of deposit. Danmarks Nationalbank's forecasts of central-government payments include a monthly and a day-to-day distribution, cf. Box B.2.

On banking days Danmarks Nationalbank publishes information on the central government's sale of domestic government securities. This information is published at 8.00 a.m. on the following day. Treasury notes and government bonds are usually sold with three days' value, while Treasury bills are normally sold with two days' value.

On the 1st banking day of each month an updated overview is published of the central government's domestic borrowing requirement, including details of the volume of the central government's foreign-exchange swaps from kroner to euro in the current fiscal year.

DN NEWS, SCREEN 12 NET POSITION AT 3.30 P.M.	Box B.1
THE NET POSITION OF THE BANKS AND MORTGAGE-CREDIT INSTITUTES VIS-À-VIS DANMARKS NATIONALBANK ON 20 FEBRUARY 2003	
CURRENT-ACCOUNT DEPOSITS	KR. 2.4 BILLION
CERTIFICATES OF DEPOSIT (NOMINAL VALUE)	
SERIES 03/08 (MATURING 21 FEBRUARY 2003)	KR. 39.5 BILLION
SERIES 03/09 (MATURING 28 FEBRUARY 2003)	KR. 81.6 BILLION
COLLATERALISED LOANS	
SERIES 03/08 (MATURING 21 FEBRUARY 2003)	KR. 23.6 BILLION
SERIES 03/09 (MATURING 28 FEBRUARY 2003)	KR. 31.5 BILLION
SUM OF THE INDIVIDUAL CURRENT-ACCOUNT LIMITS	KR. 20.5 BILLION

INFORMATION PUBLISHED ON A DAILY BASIS

Table 1.B.a

	Overall content	Found at	Time of publication
Net position at 3.30 p.m.	<ul style="list-style-type: none"> The monetary-policy counterparties' net position vis-à-vis Danmarks Nationalbank at 3.30 p.m. Current-account deposits, outstanding amount of certificates of deposit and monetary-policy loans. The overall current-account limit for the counterparties. 	<ul style="list-style-type: none"> DN-News (screen 12). Reproduced by Reuters (DKNA-12). Reproduced by Bloomberg (DCB). 	At 4.00 p.m. each banking day.
Danmarks Nationalbank's interest rates and market operations	<ul style="list-style-type: none"> Rates of interest for current accounts, certificates of deposit and monetary-policy loans. Announcement of market operations on the day of operation. 	<ul style="list-style-type: none"> DN-News (screen 11). Reproduced by Reuters (DKNA-11). Reproduced by Bloomberg (DCB). 	At 10.00 a.m. each banking day.
CIBOR	<ul style="list-style-type: none"> CIBOR with maturities of 1, 2, 3, 4, 5, 6, 9 and 12 months. Calculated on the basis of reports to Danmarks Nationalbank at 10.30 a.m. from currently 8 individual banks, the CIBOR banks. 	<ul style="list-style-type: none"> www.nationalbanken.dk under "Market info", "Money-market Rates". The rates of the individual CIBOR banks are published on the home page of the Danish Bankers Association (www.finansraadet.dk). 	At 11.00 a.m. each banking day.
T/N-interest rate	<ul style="list-style-type: none"> Turnover-weighted T/N interest rate. Calculated on the basis of reports to Danmarks Nationalbank from currently 13 large players in the Danish money market on the previous banking day's uncollateralised krone-denominated interbank lending in the T/N segment and the average interest rate of the loans. 	<ul style="list-style-type: none"> www.nationalbanken.dk under "Market info", "Money-market Rates". 	At noon each banking day.
Exchange rates	<ul style="list-style-type: none"> Danmarks Nationalbank's exchange rates. The exchange rate are normally fixed on the basis of information at 2.15 p.m. from a number of central banks. 	<ul style="list-style-type: none"> www.nationalbanken.dk under "Market info", "Exchange rates". 	Before 2.45 p.m. each banking day.
The central government's sales and buy-backs of domestic government securities	<ul style="list-style-type: none"> Sales on the previous banking day. Buy-backs on the previous banking day. 	<ul style="list-style-type: none"> DN-News (screen 51 and 58). Reproduced by Reuters (DKNA-51 and DKNA-58). Reproduced by Bloomberg (DCB). www.nationalbanken.dk under "Government debt", "Information on government borrowing and debt". 	At 8.00 a.m. each banking day.

Note: DN News is Danmarks Nationalbank's system for sending information to connected news agencies. Monetary-policy counterparties can view information from DN News via DN Inquiry and Transfer System. Direct information on most of the above topics is sent to subscribers to Danmarks Nationalbank's electronic news service (see www.nationalbanken.dk, "News service").

OTHER REGULAR INFORMATION			Table 1.B.b
	Overall content	Found at	Time of publication
Monthly distribution of government payments	<ul style="list-style-type: none"> • Forecast of the monthly distribution of government payments for the current fiscal year. • Comprises, inter alia, the gross domestic financing requirement and redemptions on the government's foreign debt. 	<ul style="list-style-type: none"> • www.nationalbanken.dk under "Market info", "Government payments". 	3 times a year after publication of the Budget Review from the Ministry of Finance, normally in May, August and December.
Day-to-day distribution of liquidity impact of central-government payments	<ul style="list-style-type: none"> • Forecast of the day-to-day distribution of the liquidity impact of the central government's payments in the coming two months. 	<ul style="list-style-type: none"> • www.nationalbanken.dk under "Market info", "Government payments". 	Penultimate banking day of each month.
The central government's domestic borrowing requirement	<ul style="list-style-type: none"> • Forecast of the central government's domestic borrowing requirement in the current fiscal year, cf. the Budget Review from the Ministry of Finance. • Subsequent buy-backs of domestic government securities and conclusion of foreign-exchange swaps from kroner to euro. • Total domestic borrowing requirement. 	<ul style="list-style-type: none"> • DN-News (screen 54). • Reproduced by Reuters (DKNA-54). • Reproduced by Bloomberg (DCB). • www.nationalbanken.dk under "Government debt", "Information on government borrowing and debt". 	First banking day of each month.
Press release on foreign exchange and liquidity	<ul style="list-style-type: none"> • Danmarks Nationalbank's net purchase of foreign exchange in the preceding month. • The central government's actual financing requirement and financing in the preceding month. • At the same time as the press release Danmarks Nationalbank publishes its monthly balance-sheet as of the end of the preceding month, with specifications on the following banking day. 	<ul style="list-style-type: none"> • DN-News (screen 31 ff). • Reproduced by Reuters (DKNA-31). • Reproduced by Bloomberg (DCB). • www.nationalbanken.dk under "Press room", "Press releases". 	At 4.00 p.m. on the second banking day of each month.
Press release in connection with interest-rate changes	<ul style="list-style-type: none"> • Change of the discount rate. • Background to the change. 	<ul style="list-style-type: none"> • DN-News (screen 81). • Reproduced by Reuters (DKNA-81). • Reproduced by Bloomberg (DCB). • www.nationalbanken.dk under "Press room", "Press releases". 	Issued when the discount rate is changed.
Individual current-account limits	<ul style="list-style-type: none"> • The individual monetary-policy counterparties' current-account limits. • The overall current-account limit for the monetary-policy counterparties. 	<ul style="list-style-type: none"> • www.nationalbanken.dk under "Monetary policy", "Instruments" or "Rules", "Monetary and foreign-exchange policy". 	Updated in connection with changes.

Note: DN News is Danmarks Nationalbank's system for sending information to connected news agencies. Monetary-policy counterparties can view information from DN News via DN Inquiry and Transfer System. Direct information on most of the above topics is sent to subscribers to Danmarks Nationalbank's electronic news service (see www.nationalbanken.dk, "News service").

FORECASTS OF THE LIQUIDITY IMPACT OF CENTRAL-GOVERNMENT FINANCES

Box B.2

Danmarks Nationalbank's daily and monthly distributions are forecasts of the future central-government payments by day and month, respectively. The monthly distribution is based on the Ministry of Finance's estimate of government finances, published in the Budget Reviews. On the basis of the Budget Reviews, the large items are distributed over the months on the basis of previous years' payment patterns, as well as information on changes in payment dates, e.g. as a result of new legislation or new payment patterns. The monthly distribution comprises the following main items of government finances: receipts, disbursements, net financing requirement, redemptions on domestic debt, gross domestic financing requirement, redemptions on foreign debt and total gross financing requirement.

On the basis of the monthly distribution of government payments, a day-by-day distribution is prepared, which also shows the dates of Danmarks Nationalbank's planned purchases and sales of certificates of deposit in the subsequent two months, cf. the example below.

DANMARKS NATIONALBANK'S LIQUIDITY FORECAST FOR MARCH AND APRIL 2003. PUBLISHED END-FEBRUARY 2003

Date	March 2003		Date	April 2003	
	Liquidity impact from the government kr. billion	Danmarks Nationalbank's planned purchases and sales of certificates of deposit		Liquidity impact from the government kr. billion.	Danmarks Nationalbank's planned purchases and sales of certificates of deposit
3 March	19.4	sale	1 April.....	18.2	sale
4 March	-15.0	purchase	2 April.....	-18.0	purchase
5 March	-7.5	purchase	3 April.....	-3.7	
6 March	0.2		4 April.....	0.7	sale
7 March	1.1	sale	7 April.....	1.3	
10 March	-0.1		8 April.....	1.5	
11 March	1.0		9 April.....	1.5	
12 March	-0.9		10 April.....	0.4	
13 March	0.8		11 April.....	1.0	sale
14 March	2.5	sale	14 April.....	-0.4	
17 March	3.6		15 April.....	3.3	
18 March	0.8		16 April.....	3.2	sale
19 March	-0.1		22 April.....	0.6	
20 March	-3.9		23 April.....	-4.9	
21 March	-2.1	sale	24 April.....	-0.9	
24 March	-2.4		25 April.....	1.1	sale
25 March	-7.1	purchase	28 April.....	-0.5	
26 March	-0.3		29 April.....	-3.9	
27 March	-13.2	purchase	30 April.....	6.2	
28 March	9.4	sale			
31 March	5.9				

CONTINUED

Box B.2

The day-to-day distribution of the liquidity impact in this Box B.2 corresponds to the "Central-government liquidity impact" column in Box 1.8, except that Box B.2 is a forecast and that central-government borrowing in kroner is not included. In addition, the day-to-day distribution in this Box B.2 takes into account that a number of the central government's regular receipts and disbursements (e.g. interest on the government's foreign debt, aid to developing countries, VAT contributions to the EU, receipts under the EU's Common Agricultural Policy and profit allocation from Danmarks Nationalbank to the central government) do not have an immediate impact on krone liquidity, cf. also Box 1.10.

On the 2nd banking day of each month Danmarks Nationalbank issues a press release with information on the central government's actual financing requirement in the preceding month, as well as Danmarks Nationalbank's total net foreign-exchange purchases during the preceding month.

Box B.3 gives an example of how the various information is linked in relation to an analysis of the liquidity development.

Access to and use of accounts at Danmarks Nationalbank are determined in Danmarks Nationalbank's terms and conditions for accounts (Documentation for monetary-policy instruments and settlement of payments in DKK, EUR and SEK), cf. Danmarks Nationalbank (2001 and 2003a). The terms and conditions constitute the concrete implementation of the overall framework for use of Danmarks Nationalbank's credit facilities and pledging of collateral at Danmarks Nationalbank. The terms and conditions are regularly updated and adjusted and can be viewed at Danmarks Nationalbank's website, www.nationalbanken.dk, under "Monetary policy", "Instruments", or under "Rules", "Monetary and foreign-exchange policy".

In addition to the above information Danmarks Nationalbank regularly publishes articles on various aspects of the monetary- and foreign-exchange-policy instruments or monetary and foreign-exchange policy in general in its Monetary Review, which is published quarterly (in February, May, September and November), and in Danmarks Nationalbank's Report and Accounts, published in March each year.

Furthermore, the Board of Governors of Danmarks Nationalbank regularly presents opinions on monetary- and foreign-exchange-policy issues in speeches, lectures, articles, interviews in news media, and at meetings in various fora, etc. Many of these can be found at Danmarks Nationalbank's website, www.nationalbanken.dk, and in its Monetary Review or Report and Accounts.

USE OF DANMARKS NATIONALBANK'S INFORMATION TO ANALYSE THE DEVELOPMENT IN THE NET POSITION OF THE MONETARY-POLICY COUNTERPARTIES

Box B.3

Central-government liquidity impact according to forecast in Box B.2, 3 March 2003	+ kr. 19.4 billion	(a)
Government sales of government securities, value date 3 March 2003	+ kr. 5.4 billion	(DN News 51)
Government purchases of government securities, value date 3 March 2003	- kr. 0.1 billion	(DN News 58)
Government net sales of government securities	+ kr. 5.3 billion	(b)
Net position on 28 February 2003	kr. 64.3 billion	(DN News 12)
Net position on 3 March 2003	kr. 78.5 billion	(DN News 12)
Change in net position	+ kr. 14.2 billion	(c)
Difference (a)-(b+c)	- kr. 0.1 billion	

The above difference in the central-government liquidity impact according to the published liquidity forecast (a) and the government's net sales of government securities in kroner, plus the change in the net position of the monetary-policy counterparties (b+c) is attributable to rounding, as well as forecasting uncertainty, Danmarks Nationalbank's net foreign-exchange purchases, Danmarks Nationalbank's net bond purchases, changes in the circulation of banknotes and coins and other factors with a liquidity impact (e.g. the government's foreign-exchange swaps from kroner to euro).

Danmarks Nationalbank's quarterly statistics for the trading volume in cash market products in the Danish money market and the BIS-coordinated survey of the Danish foreign-exchange and derivatives markets can be found in the statistical publications at Danmarks Nationalbank's website, www.nationalbanken.dk, under "Statistics".

Finally, Danmarks Nationalbank publishes a Working Paper series, which at intervals includes analyses of monetary issues of a more research-oriented nature. Danmarks Nationalbank's Working Papers are available at www.nationalbanken.dk under "Publications", "Publication overview".

APPENDIX 1.C: PLEDGING OF COLLATERAL FOR MONETARY-POLICY LOANS

Danmarks Nationalbank requires collateral for all types of lending. This not only applies to monetary-policy loans, but also to e.g. intra-day loans.

As collateral for krone-denominated loans Danmarks Nationalbank accepts most of the following securities denominated in Danish kroner, listed on the Copenhagen Stock Exchange and registered with VP Securities Services:

- Danish government securities, including bonds issued by the Fisheries Bank and the Mortgage Bank.
- Bonds guaranteed by the Kingdom of Denmark.
- Bonds issued by KommuneKredit and Danish Ship Finance.
- Mortgage-credit bonds issued by institutions subject to the Mortgage-Credit Act.

In addition, Danmarks Nationalbank may determine which other assets can be pledged as collateral for krone-denominated credit facilities, subject to a specific assessment. Certificates of deposit may also be pledged as collateral, but only for current-account overdrafts within the same day (intra-day credit).

The assets that can be pledged as collateral for monetary-policy loans amount to around kr. 2,000 billion, of which the monetary-policy counterparties hold approximately 1/5, cf. Table 1.C.1.

The pledging of collateral to Danmarks Nationalbank is structured so that a joint pool of pledged securities deposited with VP Securities Services may be pledged as collateral for both monetary-policy loans and

PLEDGEABLE ASSETS IN CONNECTION WITH DANMARKS NATIONALBANK'S MONETARY-POLICY LOANS	Table 1.C.1
	2002
Outstanding volume of pledgeable assets, kr. billion. ¹	1,874
Counterparties' portfolio of pledgeable assets, kr. billion ²	380
Counterparties' share of pledgeable assets, per cent	20
Monetary-policy loans, kr. billion	48
Counterparties portfolio of pledgeable assets, per cent of monetary-policy loans	792

Note: All data are annual averages.

Source: Danmarks Nationalbank.

¹ Circulating volume of domestic government securities in kroner and mortgage-credit bonds in kroner stated at nominal value.

² Banks' and mortgage-credit institutes' portfolios of government securities and mortgage-credit bonds stated at market value.

MARGINS AND HAIRCUTS ON PROVISION OF COLLATERAL FOR KRONE-DENOMINATED CREDIT FROM DANMARKS NATIONALBANK

Table 1.C.2

Per cent

Margin	2
Haircuts for VP-registered securities	
Residual maturity up to and including 1 year	0
Residual maturity over 1 year up to and including 3 years	1.5
Residual maturity over 3 years up to and including 7 years	2
Zero-coupon bonds with a residual maturity exceeding 7 years	5
Other assets with a residual maturity exceeding 7 years.....	3
Addition to haircut due to limited liquidity, percentage points ¹	10

Note: Floating-rate instruments are placed in the maturity bands according to the distance in time between the previous coupon setting and the next coupon resetting.

¹ If the amount in circulation in a series is less than kr. 3 billion (nominal).

intra-day loans. In practice the counterparties pledge the securities by transferring assets via the IT system DN Inquiry and Transfer System to a custody account with VP Securities Services that has been pledged to Danmarks Nationalbank. The counterparties may replace the collateral during the term of the loan by first placing securities in and then taking securities out of the pledged custody account.

Due to day-to-day fluctuations in the market value of the pledged securities, the value of the pledged custody account constantly changes. To minimise the risk that the value of the counterparty's monetary-policy loan exceeds the value of the pledged securities, the collateral value of the pledged securities is calculated by making certain securities-specific deductions ("haircuts") from their market value, depending on the securities' residual maturity and liquidity. For instance, only 98 per cent of the market value of a fixed-rate Danish government bond with a remaining term to maturity of 3-7 years may be pledged, cf. Table 1.C.2. In addition there is a general requirement for excess coverage, or margin, of 2 per cent, so that a loan of kr. 100 requires a minimum collateral value of kr. 102. If the collateral value of the pledged securities decreases during the term of the loan, further collateral must be pledged. To facilitate the day-to-day management of the collateral deposit, supplementary collateral is only required when the collateral value of the pledged securities falls below 101 per cent of the outstanding 14-day loans and loans for cash deposits. When the supplementary collateral has been called for, the collateral value must again exceed the outstanding loans plus the 2-per-cent margin.

Pledging of collateral for loans from Danmarks Nationalbank is described in more detail in Danmarks Nationalbank (2001 and 2003a).

CHAPTER 2

The Money and Foreign-Exchange Markets

The Danish money market is the market for krone-denominated inter-bank loan agreements and interest-rate derivatives with maturity of up to one year. The daily turnover of loans in the Danish money market is around kr. 60 billion, while the trading volume in interest-rate derivatives is approximately kr. 25 billion per day.

The money market is closely related to Danmarks Nationalbank's monetary-policy instruments. In principle, Danmarks Nationalbank only provides liquidity to the banks and mortgage-credit institutes – the monetary-policy counterparties – once a week. During the week the counterparties must therefore trade liquidity among themselves on market terms via the money market.

Danmarks Nationalbank's interest rates guide the short-term money-market interest rates in Denmark. A well-functioning money market is important for ensuring a clear transmission from Danmarks Nationalbank's monetary-policy interest rates to the short-term market rates. The interest rates in the money market are the basis for the interest rates which the banks offer their customers for deposits or lending.

The Danish foreign-exchange market is the market for purchase and sale of foreign exchange against Danish kroner. The total daily turnover in the Danish foreign-exchange market is around kr. 65 billion.

The foreign-exchange market is central to the monetary and foreign-exchange policy since this is the market where the krone rate is formed and Danmarks Nationalbank intervenes by buying and selling foreign exchange.

2.1 THE DANISH MONEY MARKET

The Danish money market is the market for interbank loan agreements and interest-rate derivatives denominated in kroner with a maturity of up to one year.¹ In practice the definition of the money market is often less clear-cut, however. For instance, institutional investors and mortgage-credit institutes also trade in the money market. In addition there is the special-term market where in particular major business enterprises

¹ The development in the Danish money market in recent years is described in more detail in Pedersen and Sand (2002). For more general descriptions of the Danish money and financial market and its institutions, see Andersen et al. (1999) and Wendt (2002).

and institutional investors can borrow from and place liquidity with banks on money-market terms.

The Danish money market is the market for interbank loan agreements and interest-rate derivatives denominated in kroner with a maturity of up to one year. A well-functioning money market is important for ensuring a clear transmission from Danmarks Nationalbank's monetary-policy interest rates to the short-term market rates.

The money market serves several different purposes. It is central to the exchange of liquidity between the market participants, and to the management of short-term interest-rate positions. In addition, an efficient money market is a prerequisite for a well-functioning securities market since it creates the basis for short-term financing and placement.

The money market denominated in kroner is closely related to Danmarks Nationalbank's monetary-policy instruments as described in Chapter 1. In principle, Danmarks Nationalbank only supplies liquidity to the monetary-policy counterparties once a week via the regular market operations. During the week the counterparties must therefore trade liquidity among themselves on market terms via the money market, unless Danmarks Nationalbank conducts extraordinary market operations.

Danmarks Nationalbank's interest rates guide the short-term interest rates in the Danish money market. A well-functioning money market is important for ensuring a clear transmission from Danmarks Nationalbank's monetary-policy interest rates to the short-term market rates. The interest rates in the money market are the basis for the interest rates which the banks offer their customers for deposits or lending, cf. Chapters 1 and 3.

2.1.1 PRODUCTS

A number of different instruments are traded in the money market. These instruments can be roughly divided into two groups according to their initial impact on liquidity positions.

The first group comprises cash market products whereby the conclusion of a contract implies immediate exchange of liquidity, cf. Box 2.1. Cash market products primarily comprise uncollateralised krone-denominated loans (deposits) and krone-denominated loans against collateral in bonds (repos) or foreign exchange (foreign-exchange swaps), as well as krone-denominated bonds with a remaining term to maturity of up to one year, and Danmarks Nationalbank's certificates of deposit.

CASH MARKET PRODUCTS IN THE DANISH MONEY MARKET

Box 2.1

Deposits are uncollateralised krone-denominated loans with standardised maturities from 1 day up to 12 months. Under normal circumstances the interest rate for deposits is higher than the interest rate for equivalent loans against collateral, e.g. the rate of interest for repo transactions.

Repurchase agreements (repos) are collateralised krone-denominated loans with standardised maturities from 1 day up to 6 months. The pledged collateral comprises securities, typically bonds. Repos are also known as sell and buy-back transactions since on the conclusion of the agreement the seller of the bonds (the liquidity recipient) enters into an obligation to buy back the securities at a later date at a price fixed when the agreement is entered into. The repo rate is reflected in the difference between the agreed purchase and sales prices (spot and forward prices).

Foreign-exchange swaps (FX swaps) are collateralised krone-denominated loans with standardised maturities from 1 day up to 12 months. In this case the collateral is foreign exchange, typically dollars. A foreign-exchange swap can be seen as a simultaneous spot and forward foreign-exchange contract: when the spot transaction is settled, kroner are exchanged for foreign exchange, and vice versa when the forward contract is settled. The rate of interest on the krone-denominated loan is reflected in the spot and forward exchange rates applied.

Krone-denominated bonds with a remaining term to maturity of up to one year are likewise usually regarded as a money-market product. This group includes short-term mortgage-credit bonds issued to finance adjustable-rate loans, as well as the government's Treasury bills.¹

Danmarks Nationalbank's certificates of deposit are zero-coupon papers issued by Danmarks Nationalbank as part of its monetary policy, cf. Chapter 1. Certificates of deposit can be traded among the monetary-policy counterparties, but may not be negotiated outside the group of counterparties. Trading in certificates of deposit can be used to exchange krone-denominated liquidity with same-day settlement and no credit risk.

¹ Treasury bills are issued at monthly auctions held by Danmarks Nationalbank on behalf of the central government. The cut-off rates reflect the current market rates and no monetary-policy significance can be attributed to the cut-off rates.

The cash market products are used to raise liquidity or deposit surplus funds. Moreover, certain collateralised transactions may be driven by demand for the underlying asset. For instance, a bank may be interested in extending a krone-denominated loan against collateral in a specific bond, because the bank requires the bond in order to settle a bond sale to another customer.

The second group of products comprises interest-rate derivatives for which liquidity is exchanged only as a result of settlement of interest-rate differences at a fixed time in the future, cf. Box 2.2. The most important interest-rate derivatives in the Danish money market are Forward Rate Agreements (FRAs) and short-term interest-rate swaps. Interest-rate derivatives are used by banks, business enterprises and investors to hedge interest-rate risks and for position taking.

T/N IRS (Tomorrow/Next Interest-Rate Swap) is a short-term interest-rate swap applying the T/N rate as the reference interest rate, cf. Box 2.3. When a T/N interest-rate swap is concluded the parties in principle agree to exchange payment of interest at a fixed rate (the swap rate for the maturity in question) for payment of interest at a floating day-to-day rate (the T/N rate). The interest payments are calculated on the basis of a fictive principal. The agreement can be concluded for standardised maturities between 1 and 12 months. On expiry of the swap, the parties' gains and losses are settled via the exchange of net amounts. The term "CITA swap" is often used synonymously with "T/N IRS" (CITA is an abbreviation of Copenhagen Interest T/n Average). Via interest-rate swaps a bank with a floating-rate deposit may "swap" floating-rate payments for fixed-rate payments. Considering the deposit and the interest-rate swap as one, this is equivalent to the bank having restructured its interest-rate exposure from a floating-rate deposit to a fixed-rate deposit.

FRAs (Forward-Rate Agreements) are agreements to pay interest on a fictive principal at an agreed rate for an agreed future period. At the beginning of the future period, difference settlement takes place of an amount equivalent to the difference between the agreed reference interest rate (CIBOR) and the agreed FRA rate on the fictive principal. No payments are exchanged on the conclusion of the actual contract. Standardised FRAs run for three or six months. If a bank wishes to be certain of achieving financing at the current FRA rate in a future period, the bank can purchase a FRA now and raise a loan at the market rate (CIBOR) in the future period. If CIBOR in the future period exceeds the agreed FRA rate, the bank will – via the FRA – receive an amount to compensate for the difference.

The most frequently used reference interest rates in the Danish money market are the CIBOR and the T/N rates, cf. Box 2.3. They play an important role for the money market since they are used in loan agreements and in settlement of interest-rate derivatives. Both reference interest rates are calculated and published daily by Danmarks Nationalbank on the basis of reports from a number of banks.¹

2.1.2 MARKET STRUCTURE

In principle trading in the money market is not limited to any fixed times. However, money-market transactions are normally made between 7.00 a.m. and 3.30 p.m. on banking days, when the banks can exchange liquidity via their current accounts with Danmarks Nationalbank. A transaction with liquidity effect on the same day must take place within this timeframe. When liquidity is transferred between two banks, an amount is withdrawn from the current account of the bank providing

¹ CIBOR and the T/N interest rate are market-determined reference interest rates. No monetary-policy significance can be attributed to them, even though they are calculated and published by Danmarks Nationalbank.

Reference interest rates

CIBOR (Copenhagen InterBank Offered Rate) is a reference interest rate for krone-denominated liquidity offered on an uncollateralised basis to a prime bank. CIBOR is calculated on the basis of interest rates provided by currently eight individual banks, the CIBOR reporting banks. For each maturity (1, 2, 3, 4, 5, 6, 9 and 12 months), CIBOR is calculated based on the CIBOR rate to two decimal places reported at 10.30 a.m. each day by each CIBOR reporting bank to Danmarks Nationalbank. Danmarks Nationalbank then fixes CIBOR by excluding the two highest and the two lowest interest rates and calculating a simple average of the four remaining interest rates. CIBOR rates to four decimal places are announced at 11.00 a.m. on the reporting day. The CIBOR rate is published at Danmarks Nationalbank's website, www.nationalbanken.dk under "Market info", "Money-market rates". The interest rates of the individual CIBOR reporting banks are published on the website of the Danish Bankers Association, www.finansraadet.dk, which also presents more detailed information on the rules for determining CIBOR. No CIBOR reporting bank is obliged to provide liquidity at its quoted CIBOR rate.

The *T/N* (Tomorrow/Next) rate is a day-to-day reference interest rate for a loan taking effect on the 1st banking day after the trade date and expiring on the 2nd banking day after the trade date. The T/N rate is fixed on the basis of reports to Danmarks Nationalbank by currently 13 large participants in the Danish money market. The reporting participants provide information on the previous banking day's uncollateralised krone-denominated interbank lending in the T/N segment, and the average interest rate on the loans. On the basis of these reports Danmarks Nationalbank calculates a turnover-weighted T/N rate, which is published at noon on the reporting day. The T/N rate is published at Danmarks Nationalbank's website under "Market info", "Money-market rates". This rate has been selected as the day-to-day reference rate in the Danish money market because the major part of the market for uncollateralised day-to-day interbank lending is on a T/N basis.

CIBOR corresponds to EURIBOR (Euro InterBank Offered Rate) on the money market in the euro area. The day-to-day interest rate in the euro area is EONIA (Euro OverNight Index Average), which is a rate of interest on euro-denominated lending commencing on the day that the contract is concluded, and expiring on the following banking day.

Market conventions

In the Danish money market the settlement date (value date) is normally two banking days after the trading day ($t+2$). The yield to maturity in per cent p.a. is normally calculated according to the money-market convention on the basis of "actual/360", with simple accrual of interest (no compound interest).

the liquidity. This amount is then placed on the current account of the bank receiving the liquidity.

Trading in the money market takes place via brokers or directly among the participants.

Money-market brokers are intermediaries who do not themselves take positions, but solely establish contact between agents supplying and

MARKET MAKING IN THE DANISH MONEY MARKET

Box 2.4

The market-making agreements in the Danish money market comprise around 10 banks. The banks participate in the agreements to varying extents.

Under the market-maker agreements, the participating banks are obliged to continuously state binding two-way (bid and offer) prices for fixed amounts vis-à-vis the other market makers. A maximum bid/offer spread has been fixed for each product and each maturity comprised by the agreements. Prices are stated by telephone or via money-market brokers.

The agreements operate with several "models" with varying bid/offer spreads, depending on the market conditions. Under normal circumstances the spread is typically 5-10 basis points, increasing to 25-30 basis points in turbulent market conditions. The participants agree among themselves when to change from one model to another.

The market-maker agreements comprise repo transactions, FRAs, T/N IRSs, and Treasury bills, whereas deposits are not included. Concerning market making in foreign-exchange swaps see Box 2.9.

demanding money-market products. On an anonymous basis, the brokers continuously state the best bid and offer prices in the individual products for standardised maturities on the basis of rates provided by the individual banks. Prices are stated electronically and by telephone. Only a small proportion of trading in the Danish money market takes place via brokers. The majority of the broker-based transactions are handled via the only remaining local money-market broker. In addition, several participants use foreign brokers based in e.g. London and Frankfurt.

The majority of the trading in the money market is conducted via direct telephone contact between the counterparties. This eliminates brokerage costs, and also enables trading in non-standardised maturities and contract sizes.

A number of banks have concluded mutual agreements on market making in the various segments of the money market. Market makers continuously set binding two-way prices vis-à-vis each other for fixed amounts in a number of specified products. Market making contributes to ensuring a certain level of liquidity in the money market. The market-maker agreements in the Danish money market are described in more detail in Box 2.4.

2.1.3 TRADING VOLUME

Danmarks Nationalbank regularly compiles statistics from 13 banks on their money-market trading volume in deposits, repos and foreign-exchange swaps, cf. Damm and Pedersen (1997). The statistics are estimated to cover most of the turnover in these products. Box 2.5 provides a brief description of the statistics.

**DANMARKS NATIONALBANK'S STATISTICS FOR TURNOVER IN CASH
MARKET PRODUCTS**

Box 2.5

Danmarks Nationalbank's statistics for turnover in cash market products comprise deposits, repos and foreign-exchange swaps. The statistics are based on monthly data from the currently 13 banks in Denmark that also report data for calculation of the T/N rate, cf. Box 2.3. The banks only report their lending of krone-denominated liquidity, but not the liquidity received. The statistics are broken down as lending to resident and non-resident banks and as the maturities 1-6 days, 7-33 days, and more than 33 days.

The statistics are found to cover most of the turnover in deposits, repos and foreign-exchange swaps in the Danish money market. Money-market lending by other banks in Denmark is relatively limited, which also applies to krone-denominated lending from banks abroad to banks in Denmark. The trading volume in cash market products dominated in Danish kroner among banks abroad is also found to be insignificant.

The trading-volume statistics are published on a quarterly basis and can be found among the statistical publications at Danmarks Nationalbank's website www.nationalbanken.dk, under "Statistics".

In 2002 the total trading volume in cash market products in the money market averaged around kr. 60 billion per banking day. The large volume especially reflects that the transactions are often very short-term, in many cases only one day. Foreign-exchange swaps account for around half of the trading volume, while the remainder is more or less equally divided between repos and deposits, cf. Chart 2.1. The trading volume in Danmarks Nationalbank's certificates of deposit in the money market has been relatively modest.

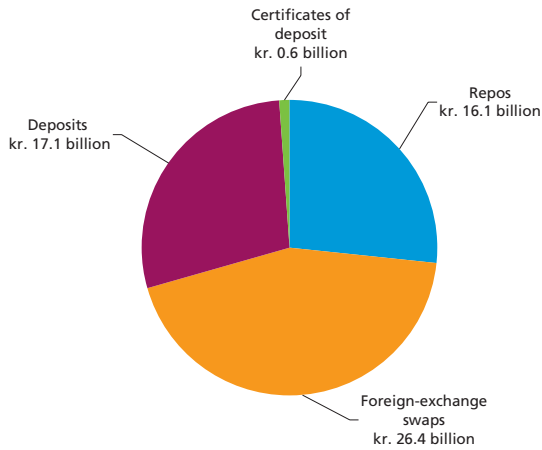
The money-market trading volume in short-term bonds is moderate compared to the other cash market products. According to the trading-volume statistics of the Copenhagen Stock Exchange¹ Treasury bills, for example, are not generally traded actively after issue. The total trading volume in short-term mortgage-credit bonds is normally also significantly below the turnover in the other cash market products.

Little information is available on the trading volume in interest-rate derivatives in the Danish money market. The only official statistics derive from the regular survey of the foreign-exchange and derivatives market, which is coordinated by the Bank for International Settlements, BIS, cf. Christoffersen and Seneca (2001). This survey is conducted every three years, most recently in April 2001, and comprises products traded be-

¹ The statistics from the Copenhagen Stock Exchange also include trading outside the money market. These figures are therefore not included in Chart 2.1. The statistics are available on the website of the Copenhagen Stock Exchange (www.xcse.dk).

AVERAGE DAILY TURNOVER IN CASH MARKET PRODUCTS ON THE MONEY MARKET IN 2002

Chart 2.1



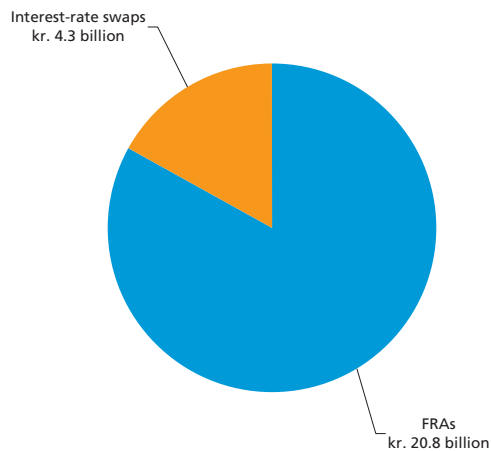
Note: For deposits, repos and foreign-exchange swaps: average trading volume in krone-denominated loans per banking day. The trading volume can fluctuate considerably from day to day, and changes between the preferred maturity segments may affect the interpretation of the figures. The latter is due to the fact that, all other things being equal, the trading volume in products in the short-term range of the money market (1-6 days) is higher than the trading volume in products with longer maturities, since loans with short maturities are refinanced more frequently than loans with longer maturities.

For certificates of deposit: interbank trading in certificates of deposit. Average trading volume per banking day.

Source: Danmarks Nationalbank.

AVERAGE DAILY TURNOVER IN INTEREST-RATE DERIVATIVES IN APRIL 2001

Chart 2.2



Note: Average per banking day. The trading volume includes OTC trading in krone-denominated interest-rate derivatives (trading Over The Counter, i.e. trading directly between counterparties, not via an exchange). The trading volumes in Charts 2.1 and 2.2 are not immediately comparable. Chart 2.1 includes only the banks' krone-denominated lending, while the trading volume in Chart 2.2 comprises both purchase and sale of contracts. In addition, Chart 2.2 includes transactions with all customers, while Chart 2.1 comprises only lending to other banks. Finally, the average maturity of interest-rate derivatives is somewhat longer than that of cash market products, so that – all other things being equal – the significance of interest-rate derivatives is underestimated when only trading-volume figures are considered.

Source: Danmarks Nationalbank.

tween counterparties outside the exchanges.¹ Danmarks Nationalbank conducts the Danish part of the survey, which involves 11 banks that overall are found to handle 99 per cent of the turnover in the Danish foreign-exchange and derivatives market. In April 2001 the average daily turnover in FRAs and interest-rate swaps was around kr. 25 billion, cf. Chart 2.2.

2.2 THE FOREIGN-EXCHANGE MARKET

The Danish foreign-exchange market is the market for purchase and sale of foreign exchange against Danish kroner.² All transactions involving transfer of a position in Danish kroner against foreign currency from one market participant to another are part of the Danish foreign-exchange market. The market is not geographically delineated. Purchase and sale of foreign exchange against Danish kroner between non-residents thus also forms part of the Danish foreign-exchange market.

The foreign-exchange market is central to the monetary and foreign-exchange policy since the krone rate is formed in this market. The need for a foreign-exchange market to hedge exchange-rate risks and conversions between kroner and foreign exchange derives mainly from capital movements and foreign trade.

Since 1988 all payments to and from Denmark have been fully liberalised. This means that today there are no restrictions on transactions with abroad, including loans from and deposits with foreign banks, as well as portfolio investments and direct investments.³

The Danish foreign-exchange market is the market for purchase and sale of foreign exchange against Danish kroner, regardless of whether the trade takes place in Denmark or abroad. The foreign-exchange market is central to the monetary and foreign-exchange policy since this is the market where the krone rate is formed and Danmarks Nationalbank intervenes by purchasing and selling foreign exchange.

Danmarks Nationalbank's key function in the foreign-exchange market is the purchase and sale of foreign exchange in connection with inter-

¹ Short-term interest-rate derivatives are no longer traded on the Copenhagen Stock Exchange.

² Trading in CIBOR futures, which was introduced in 1993, has ceased due to low trading volumes.

³ The Danish foreign-exchange market is described in more detail in Krabbe and Pedersen (1998).

³ There is, however, still a reporting obligation vis-à-vis Danmarks Nationalbank for residents' payments to and from abroad where such payments exceed kr. 250,000. The information reported is used by Danmarks Nationalbank to compile monthly statistics for financial payments to and from abroad. The information is applied to the compilation of Denmark's balance of payments which is prepared and published by Statistics Denmark.

vention to stabilise the krone vis-à-vis the euro. As banker to the central government Danmarks Nationalbank also handles e.g. payments related to the servicing of the central government's external debt denominated in foreign exchange, cf. Chapter 1.

In principle, the market for purchase and sale of foreign exchange against kroner comprises a wide range of transactions and participants. This publication solely considers the professional foreign-exchange market, i.e. large transactions between Danish foreign-exchange dealers (banks), Danish customers (typically large business enterprises and investors), foreign customers and foreign-exchange dealers, and Danmarks Nationalbank.

2.2.1 PRODUCTS

Trading in the Danish foreign-exchange market primarily comprises spot transactions, forward contracts and foreign-exchange swaps. Foreign-exchange options are also traded. The products in the Danish foreign-exchange market are described in more detail in Box 2.6.

A spot transaction is the simplest product. It is used for simple conversion between kroner and foreign exchange. For example, an export company with revenue in dollars and expenditure in kroner may wish to sell its dollar revenues in return for Danish kroner.

Forward contracts may be used by companies to hedge the exchange-rate risk associated with their transactions. If an export company knows

PRODUCTS IN THE DANISH FOREIGN-EXCHANGE MARKET

Box 2.6

The products in the Danish foreign-exchange market all involve the exchange of payments in foreign currency against Danish kroner.

Spot transactions are foreign-exchange transactions (purchase and sale of foreign currency against Danish kroner) for settlement not later than two banking days after the conclusion of the contract.

Forward contracts are foreign-exchange transactions for settlement later than two banking days after the conclusion of the contract.

FX swaps are foreign-exchange swaps comprising a spot transaction combined with an opposite forward contract. As stated in Section 2.1, foreign-exchange swaps with "one leg in Danish kroner" are to a far greater degree a money-market product than a foreign-exchange-market product.

Currency swaps involve ongoing exchange of interest payments and an exchange of principals in different currencies at the beginning and end of the contract term. A currency swap can thus be seen as an exchange of loans in different currencies.

Foreign-exchange options are transactions giving one of the parties the right, but not the obligation, at a fixed time in the future to purchase or sell an amount in one currency against an amount in another currency at an agreed rate.

that it will receive dollars in six months' time, it can sell this future dollar revenue forward in order to fix the revenue's value in kroner in advance. The company can thus immunise itself against exchange-rate fluctuations. Likewise, non-residents holding krone-denominated bonds can hedge their position by forward sale of their future krone-denominated payments from the bonds.

Foreign-exchange options can also be used to hedge the exchange-rate risk. An export company which will receive dollars in e.g. six months' time can buy an option giving the right, but not the obligation, to sell the dollars for kroner at a specific exchange rate in six months' time. The company is thus guaranteed a minimum exchange rate for its revenue denominated in dollars. The company pays a premium for the option that depends on several factors, primarily maturity, exchange-rate volatility and the required minimum exchange rate.

2.2.2 MARKET STRUCTURE

In broad terms, the participants in the Danish foreign-exchange market can be divided into customers, foreign-exchange dealers and brokers.

Customers are typically private companies that need to purchase and sell foreign exchange in connection with payments to and from abroad, or investors who purchase and sell foreign securities. In addition, municipalities and public enterprises may also have substantial foreign-exchange payments to and from abroad.

Foreign-exchange dealers are banks that purchase and sell foreign exchange for their customers, to hedge their own positions, or in connection with currency arbitrage (e.g. simultaneous purchase and sale of kroner against euro in order to exploit minor price differences to achieve a risk-free gain).

In addition to the direct participants in the foreign-exchange market there are also brokers that act as intermediaries between buyers and sellers without actually being a party to the contract themselves. In the Danish foreign-exchange market there is one local foreign-exchange broker, but only part of the trading volume in the foreign-exchange market passes through this broker. The remainder is transacted directly between the participants. Foreign-exchange practices and conventions are described in Box 2.7.

Each banking day Danmarks Nationalbank publishes information on the rate of the Danish krone vis-à-vis a number of other currencies, cf. Box 2.8. The exchange rates are published solely for information purposes. Foreign exchange cannot be purchased from or sold to Danmarks Nationalbank at the published rates. The rates published by Danmarks

PRACTICES AND CONVENTIONS IN RELATION TO FOREIGN-EXCHANGE
TRANSACTIONS

Box 2.7

Foreign-exchange transactions predominantly comprise conversions between immediately realisable bank deposits in kroner and foreign exchange. In practice, bid and offer rates for foreign exchange are stated, either directly by telephone, via a broker or via electronic systems such as Reuters Dealing or Electronic Broking Service.

The Danish foreign-exchange market is far smaller than both the dollar and euro markets. In practice rates are therefore only quoted vis-à-vis very few large currencies, while rates vis-à-vis smaller currencies are fixed indirectly via cross rates. For instance, when banks fix the rate of GBP vis-à-vis DKK, this rate is calculated on the basis of the EUR cross rates, i.e. EUR/GBP and EUR/DKK.¹

Settlement in the foreign-exchange market usually takes place two banking days after the trading day (t+2). One or more closing days in a country will defer settlement of all the trades in which that country's currency are included by another day or more.

Transfer of the traded currencies usually takes place via a bank in the home country of the currency in question. For instance, GBP is settled via a bank in the UK. This need not be a British bank, but could also be a UK branch of a foreign bank. All foreign-exchange dealers have a network of correspondent banks holding foreign-exchange accounts in different countries. In practice the parties independently send payment instructions to their respective correspondent banks to transfer the sold amount to the counterparty's account with its correspondent bank.

In recent years there has been focus on this type of settlement, which involves certain risks since the parties cannot be certain that the counterparty will send its payment instructions and effect payment. Generally there is a trend in the international foreign-exchange markets towards the use of clearing centres or netting systems whereby such risks can to some extent be reduced. In September 2002 an international settlement system was introduced for foreign-exchange transactions, called CLS (Continuous Linked Settlement). CLS is owned by a number of the world's largest commercial foreign-exchange dealers and is aimed at reducing the settlement risks in connection with international foreign-exchange trading. This is achieved by ensuring that both parties to a foreign-exchange trade pay their part of the transaction to CLS before payments are exchanged. The Danish krone is expected to be included in CLS in the 2nd half of 2003, cf. Appendix 1.A. Settlement risks in connection with foreign-exchange trading are discussed in more detail in ECB (2003) and Danmarks Nationalbank (2003).

² The ISO currency codes used in Box 2.7 are described in Box 2.8.

Nationalbank are applied in many contexts (e.g. in many contracts, for the banks' cash foreign-exchange transactions with customers, etc.) where the parties wish to use an independent source.

A number of banks have entered into agreements to act as market makers in the foreign-exchange market, parallel to the market-maker agreements in the money market. In the foreign-exchange market there are market-maker agreements for spot transactions vis-à-vis the euro and

DANMARKS NATIONALBANK'S EXCHANGE RATES

Box 2.8

Danmarks Nationalbank's exchange rates are published before 2.45 p.m. on each banking day. They are usually fixed at 2.15 p.m. on the basis of information from a number of central banks. The rates are stated as Danish kroner (DKK) per 100 units of the foreign currency, and information is published on the rate of the krone vis-à-vis the following currencies:

<i>Country</i>	<i>Currency</i>	<i>ISO code</i>
Euro area	Euro	EUR
USA	Dollars	USD
UK	Pounds sterling	GBP
Sweden	Kronor	SEK
Norway	Kroner	NOK
Iceland	Kronur	ISK
Switzerland	Francs	CHF
Canada	Dollars	CAD
Japan	Yen	JPY
Australia	Dollars	AUD
New Zealand	Dollars	NZD
Estonia	Kroons	EEK
Latvia	Lats	LVL
Lithuania	Litas	LTL
Poland	Zlotys	PLN
Czech Republic	Koruny	CZK
Hungary	Forints	HUF
Hong Kong	Dollars	HKD
Singapore	Dollars	SGD
SDR	(calculated)	XDR

SDR (Special Drawing Rights) are calculated on the basis of a basket of currencies (USD, EUR, GBP and JPY). This basket is defined by the International Monetary Fund (IMF).

In addition to the above rates, an index for the so-called effective krone rate is published. The effective krone rate is calculated as a weighted average of the development in the bilateral krone rates vis-à-vis Denmark's most important trading partners. The weights are calculated on the basis of trade in manufactured goods in 1995, cf. Pedersen (1998). An increase in the index reflects a strengthening of the krone vis-à-vis the weighted average of the currencies included in the index. The effective krone rate is described in more detail in Chapter 3.

The rates can be seen at Danmarks Nationalbank's website, www.nationalbanken.dk, under "Market info", "Exchange rates".

for forward contracts/FX swaps vis-à-vis the dollar. These are the segments with the largest trading volume in the foreign-exchange market. Market makers are subject to an obligation to state binding two-way prices vis-à-vis each other with a fixed maximum bid/offer spread for a certain amount, cf. Box 2.9.

MARKET MAKING IN THE DANISH FOREIGN-EXCHANGE MARKET

Box 2.9

The market-making agreements in the Danish foreign-exchange market involve around 10 different banks.

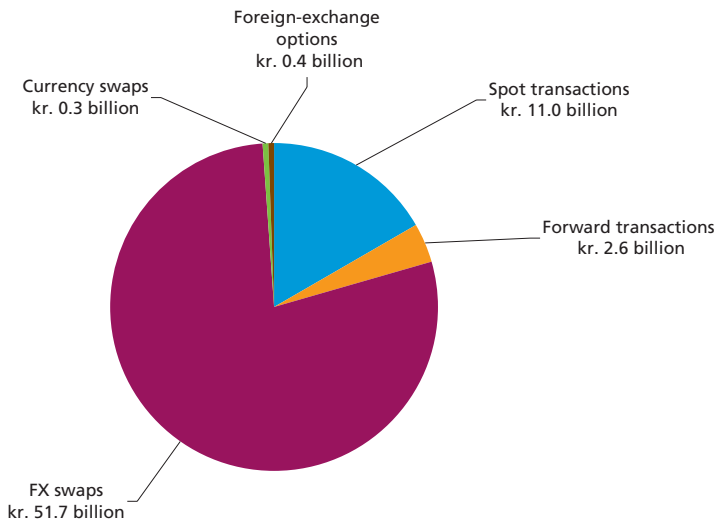
Market makers are subject to an obligation to state binding two-way prices vis-à-vis each other with a fixed maximum bid/offer spread for a certain amount.

Spot-market agreements are typically fixed for one year at a time and apply on calm days. On days with turmoil on the foreign-exchange market, market makers typically enter into new, short-term agreements with a larger bid/offer spread. The difference between the maximum bid and offer prices which can be quoted by the market makers is usually kr. 0.05 per 100 euro (5 pips) in the market-maker agreement for euro spot transactions. The amounts to which the banks commit themselves under the agreements vary from bank to bank. During the last few years each bank has typically committed itself for 10-30 million euro.

For forward contracts and FX swaps there are only market-maker agreements between the banks for dollar transactions. In periods of volatility in the foreign-exchange market the market participants usually also enter into market-making agreements in foreign-exchange options on dollars.

AVERAGE DAILY TURNOVER IN THE DANISH FOREIGN-EXCHANGE MARKET
IN APRIL 2001

Chart 2.3



Note: Average per banking day. The trading volume comprises trading in foreign-exchange contracts involving Danish kroner. The trading volumes in Charts 2.1 and 2.3 are not immediately comparable. Chart 2.1 only includes the banks' krone-denominated lending, while the trading volume in Chart 2.3 comprises both purchase and sale of contracts. In addition, Chart 2.3 includes transactions with all customers, while Chart 2.1. only comprises lending to other banks.

Source: Danmarks Nationalbank.

2.2.3 TRADING VOLUME

The only official trading-volume statistics for the foreign-exchange markets derive from the previously described survey of the foreign-exchange and derivatives market which is coordinated by the BIS.

The total average trading volume per banking day in the Danish foreign-exchange market was kr. 66 billion in April 2001. Foreign-exchange swaps (FX swaps) accounted for around 75 per cent of the trading volume, cf. Chart 2.3. FX swaps with one leg in kroner should, however, be seen as a money-market product rather than as a foreign-exchange-market product since the purpose of this type of FX swap is often to raise or lend krone liquidity against collateral in a foreign-exchange amount, cf. section 2.1. The remainder of the trading volume primarily comprises spot transactions and to a lesser degree forward contracts.

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CHAPTER 3

Monetary Policy, Financial Conditions and the Real Economy

The financial markets and the real economy are interrelated. Price formation in the financial markets is affected by expectations of future economic growth and inflation. On the other hand, changes in interest and exchange rates influence the consumption and investment decisions of corporations and households, and thereby future growth and inflation. A key issue is which factors affect the formation of interest and exchange rates, and how and to what extent this influences the real economy.

Since Denmark's monetary-policy objective is to hold the krone stable vis-à-vis the euro, Danmarks Nationalbank does not base its interest-rate decisions on macroeconomic developments. Danmarks Nationalbank normally changes its interest rates when the European Central Bank, ECB, changes the monetary-policy interest rates in the euro area.

The monetary-policy interest rates and expectations of their future course are of greatest significance to the short-term market rates, i.e. interest rates in the money-market and on bonds with maturities of up to 1-2 years. The relationship between the long-term interest rates and the monetary-policy interest rates is less straightforward.

Since the euro fluctuates against other currencies such as the US dollar and the Swedish krona, the Danish krone's rate vis-à-vis these currencies will also fluctuate.

Fluctuations in Danish interest and exchange rates affect economic activity and prices in Denmark. Despite the increasing importance of adjustable-rate loans in recent years, long-term interest rates are particularly important to investments by corporations and to house purchases by households. At the same time, changes in the long-term interest rates will affect house prices, and thereby the wealth of households. This in turn affects private consumption. Changes in the krone rate vis-à-vis currencies other than the euro influence foreign trade via trading relations with countries outside the euro area.

3.1 FORMATION OF INTEREST AND EXCHANGE RATES

3.1.1 External influences on Danish interest rates

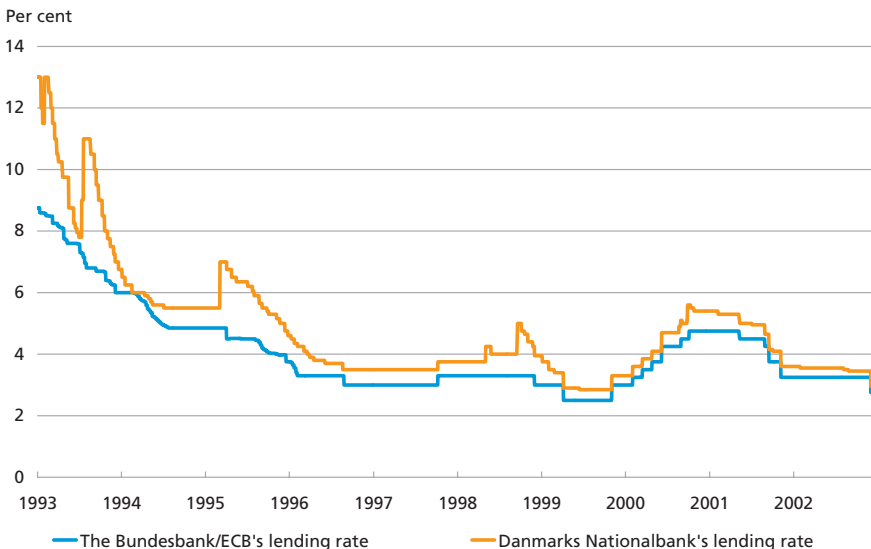
Under Denmark's fixed-exchange-rate policy the sole aim of monetary and foreign-exchange policy is to keep the Danish krone stable vis-à-vis the euro. Other considerations besides the exchange rate, such as macro-economic developments in Denmark, are not included in monetary-policy considerations.

When the foreign-exchange market is stable, the monetary-policy interest rates in Denmark normally follow the monetary-policy interest rates in the euro area, cf. Chart 3.1. If the krone rate against the euro tends to strengthen or weaken, Danmarks Nationalbank will first intervene in the foreign-exchange market to stabilise the krone. If the trend is persistent, Danmarks Nationalbank will unilaterally change the spread between the monetary-policy interest rates in Denmark and the euro area, cf. Chapter 1.

The short-term market interest rates are strongly influenced by the monetary-policy interest rates. This not only applies to the current level of the monetary-policy interest rates, but also to the expectations of the future course of them. In view of the fixed-exchange-rate policy vis-à-vis the euro the expectations of the future monetary policy in the euro area particularly affect the money-market interest rates in Denmark. The ECB

LENDING RATES OF THE ECB AND DANMARKS NATIONALBANK

Chart 3.1

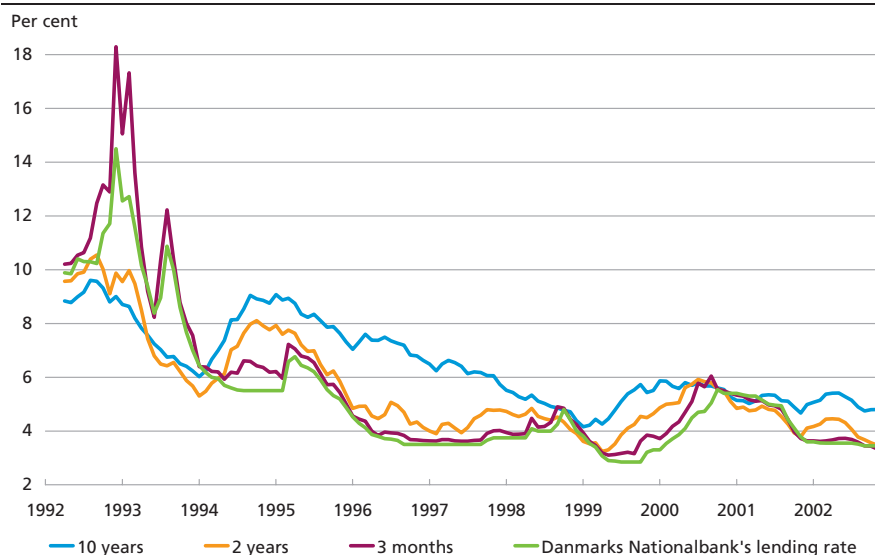


Note: For the ECB the minimum bid rate is applied as from June 2000. From 1999 to June 2000, the ECB's fixed allotment rate applies. The Bundesbank's repo rate is applied before 1999.

Source: Deutsche Bundesbank, the ECB and Danmarks Nationalbank.

DANISH INTEREST RATES FOR VARIOUS MATURITIES

Chart 3.2



Note: Monthly averages. The 10-year and 2-year interest rates are government-bond yields, while the 3-month interest rate is an uncollateralised money-market interest rate.

Source: Danmarks Nationalbank.

sets the monetary-policy interest rates for the euro area in order to maintain price stability in the euro area, cf. Chapter 4.

The short-term interest rates in Denmark are predominantly determined by conditions in the euro area.

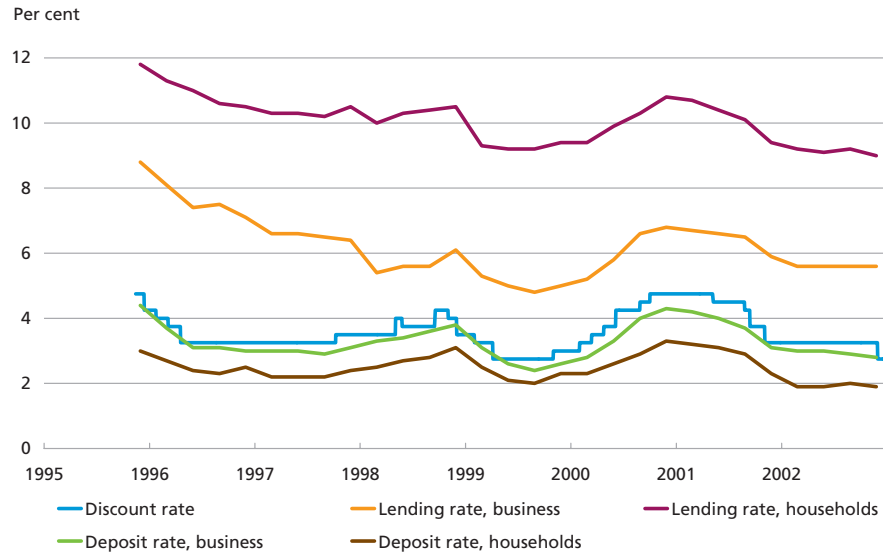
The most obvious transmission from the monetary-policy interest rates to the market interest rates is seen in the money market and in bonds with maturities of up to 1-2 years, cf. Chart 3.2. In situations with foreign-exchange unrest that is perceived as temporary by financial markets, Danmarks Nationalbank's lending rate and the short-term money-market interest rates may, however, fluctuate considerably without significantly affecting the 1-2-year interest rates. This was the case e.g. during the foreign-exchange unrest in 1992-93. The correlation between long-term interest rates and the monetary-policy interest rates is more complex, since expectations of the future course of inflation and real interest rates in the euro area and in Denmark play a significant role.

3.1.2 The banks' interest rates

The banks' average interest rates follow the monetary-policy interest rates relatively closely, cf. Chart 3.3. The banks typically change their

THE DISCOUNT RATE AND THE BANKS' AVERAGE DEPOSIT AND LENDING RATES

Chart 3.3



Note: Discount rate: daily observations. The other interest rates are quarterly averages.

Source: Statistics Denmark and Danmarks Nationalbank.

retail interest rates when Danmarks Nationalbank change the discount rate. The retail interest rates are the rates of interest applied to most households and small corporations. Some of the banks' deposits from and lending to major business customers are subject to terms close to money-market terms. The rates of interest for these agreements are very closely associated with the development in money-market interest rates, and thereby in Danmarks Nationalbank's lending rate.

The banks' interest rates normally closely follow the course of the monetary-policy interest rates.

In situations with foreign-exchange unrest, which is perceived as temporary, Danmarks Nationalbank may raise the lending rate without simultaneously raising the discount rate. In such cases, the banks will often refrain from changing their retail interest rates, but change the rates of interest for agreements on money-market terms.

The close relation between the banks' retail interest rates on the one hand and Danmarks Nationalbank's interest rates and the short-term market rates on the other can be attributed to two main factors. Firstly, deposits with and lending by the banks are mostly subject to variable

interest rates. Secondly, Danmarks Nationalbank's monetary-policy instruments and the short-term money market are a possible marginal source of financing for the individual bank.

3.1.3 Money-market interest rates and short-term bond yields

Products in the very short-term money market, i.e. with maturities of up to around 14 days, are close substitutes for Danmarks Nationalbank's monetary-policy instruments. The short-term money-market interest rates therefore follow Danmarks Nationalbank's interest rates very closely, cf. Chapter 1.

For slightly longer maturities, the money-market interest rates may in some periods deviate from Danmarks Nationalbank's interest rates, e.g. if the market expects Danmarks Nationalbank to change the monetary-policy interest rates within the next few months. Since Danmarks Nationalbank's interest rates normally follow the ECB's interest rates, the money-market interest rates in Denmark will follow developments in equivalent interest rates in the euro area very closely. Expectations of the ECB's monetary policy thus play a key role in determining the course of the slightly more longer-term Danish money-market interest rates.

Changes in Danmarks Nationalbank's interest rates that are perceived as temporary do not normally have any significant impact on interest rates for maturities of around 1-2 years.

Interest rates for maturities of up to 1-2 years are strongly influenced by the level of the monetary-policy interest rates as well as expectations of their future course. In the light of Denmark's fixed-exchange-rate policy the course of equivalent interest rates in the euro area and expectations of the ECB's monetary policy play a key role in the development of these interest rates.

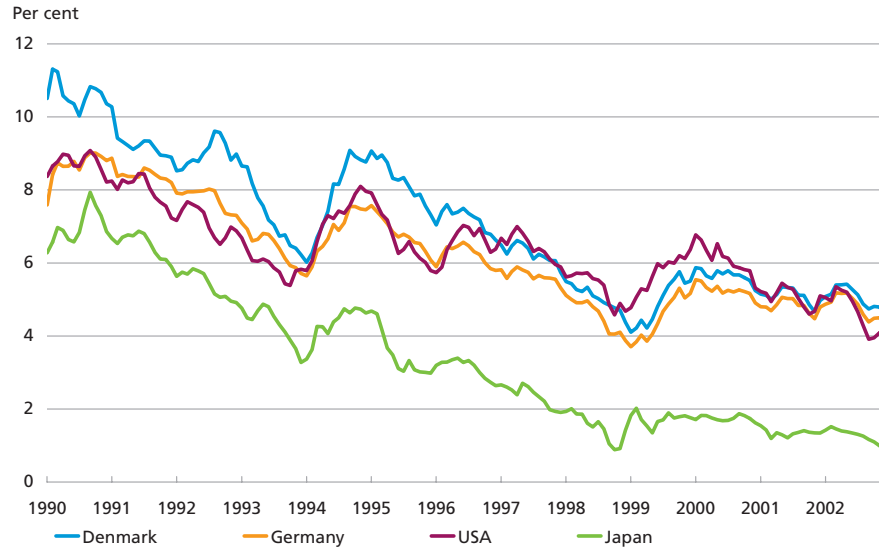
3.1.4 Long-term interest rates

There is no direct or unequivocal relation between the monetary-policy interest rates and the long-term interest rates. Long-term interest rates reflect long-term expectations of inflation and real interest rates. In theory, this is a complex relation, making it impossible without further assumptions to determine the course of the long-term interest rates when the monetary-policy interest rates are changed.¹ In addition, long-term interest rates reflect the credit and liquidity risks for the individual bond types.

¹ See e.g. Ellingsen and Söderström (2001) for an analysis of how long-term interest rates react differently in different situations when the monetary-policy interest rates are changed.

10-YEAR GOVERNMENT-BOND YIELDS IN SELECTED COUNTRIES

Chart 3.4



Note: Monthly averages.

Source: Danmarks Nationalbank.

For many countries, the level of inflation is the dominant factor determining the level of long-term interest rates. If the financial markets are confident that monetary policy and other economic policies can keep inflation at a stable, low level, the long-term inflation expectations will be relatively stable, and changes in monetary-policy interest rates by the central banks will not necessarily have an impact on developments in long-term interest rates. On the other hand, if there is uncertainty concerning the ability and commitment to pursue an economic policy consistent with low inflation, bond investors will require a premium, and thereby higher interest rates as compensation for the risk of deterioration in the purchasing power of savings.

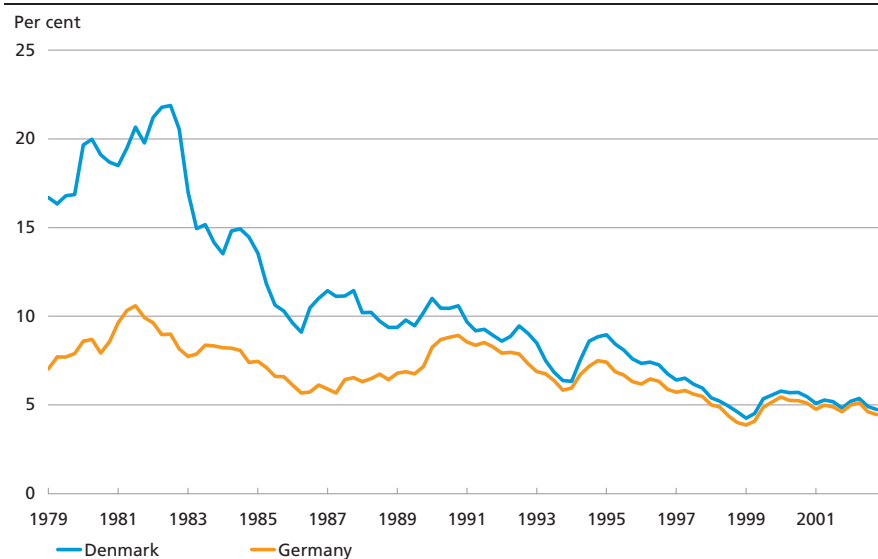
The long-term Danish bond interest rates are significantly influenced by the development in equivalent interest rates in the euro area. In a more global perspective the interest rates in the industrialised countries tend to show the same overall fluctuations, despite large exchange-rate fluctuations. This can be attributed to unrestricted international capital flows and relatively homogenous developments in inflation, cf. Chart 3.4.¹

The course of the long-term Danish interest rates is determined primarily by the equivalent interest rates in the euro area.

¹ The relation between interest-rate developments in Denmark and abroad is described in e.g. Hansen (1995) and in Ølgaard (1997).

10-YEAR BOND YIELDS IN DENMARK AND GERMANY

Chart 3.5



Note: Quarterly averages.

Source: Danmarks Nationalbank.

Interest rates in different countries may naturally take different courses in line with different economic developments. This was the case in Denmark during the crisis in the European Monetary System in 1992-93 when the Danish-German 10-year yield differential widened for a short period, cf. Chart 3.5. The Chart also clearly shows how the transition to a consistent fixed-exchange-rate policy in 1982 gradually gained credibility, whereby devaluation and inflation expectations in Denmark were reduced. As a consequence, the yield differential to Germany narrowed considerably from more than 12 per cent in 1982 to around 0.25 per cent in 2002.

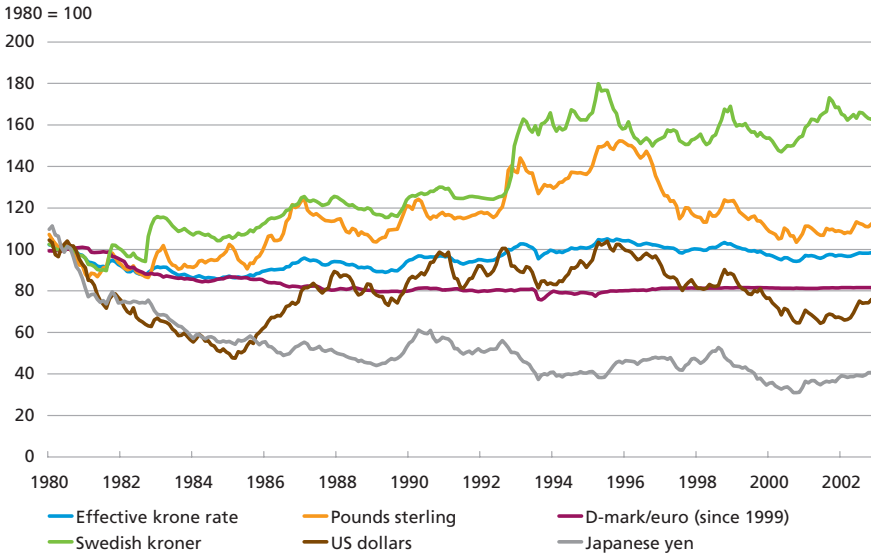
3.1.5 The effective krone rate

Since the krone's fluctuation vis-à-vis the euro is held at a very modest level due to the fixed-exchange-rate policy, the krone will match the euro's fluctuation against other currencies.

The krone may weaken against one currency and strengthen against another at the same time. To assess when the krone overall weakens or strengthens the "effective krone rate" is calculated. It is a weighted average of the bilateral exchange rates vis-à-vis Denmark's major trading partners, cf. Chart 3.6. An increase in the effective krone-rate index indicates a strengthening of the krone vis-à-vis the weighted average of the currencies in the index.

EFFECTIVE KRONE RATE AND BILATERAL KRONE RATES

Chart 3.6



Note: For the bilateral exchange rates an increase in an index reflects the krone's strengthening against the currency in question. For the effective krone rate an increase in the index reflects the krone's strengthening vis-à-vis the weighted average of the currencies included in the index.

Source: Danmarks Nationalbank.

The effective krone-rate index has been relatively stable since 1980, even though the exchange-rate policy is not aimed at managing the index. On the other hand, the bilateral krone rate has varied considerably vis-à-vis individual currencies, with the weakening of the Swedish krona and the strengthening of the yen as the most extreme examples among the currencies in Chart 3.6.

The weights in the krone-rate index reflect the competition environment for trade in industrial goods and are shown in Table 3.1.¹ The euro area is clearly Denmark's most important trading partner, accounting for almost 60 per cent of the weight basis. However, in view of the fixed-exchange-rate policy, fluctuations in the effective krone rate are attributable to the krone's fluctuation against the largest trading partners outside the euro area.

The effective krone rate is a weighted measure of the krone's fluctuation vis-à-vis the euro and other currencies. It is not possible to manage the effective krone rate while also pursuing a fixed-exchange-rate policy vis-à-vis the euro.

¹ The weights are calculated on the basis of trade in industrial goods in 1995. The effective krone rate index is described in further detail in Ølgaard (1992) and Pedersen (1996 and 1998a).

WEIGHTS IN DANMARKS NATIONALBANK'S EFFECTIVE KRONE-RATE INDEX	Table 3.1
	Per cent
Euro area (EUR)	57.7
Sweden (SEK)	9.4
UK (GBP)	8.6
USA (USD)	7.5
Japan (JPY)	5.9
Norway (NOK)	3.7
Switzerland (CHF)	2.4
Poland (PLN)	1.5
South Korea (KRW)	1.4
Canada (CAN)	0.5
Australia (AUD)	0.5
Czech Republic (CZK)	0.4
Hungary (HUF)	0.3
Iceland (ISK)	0.1
New Zealand (NZD)	0.1
Total	100.0

Source: Danmarks Nationalbank.

3.2 FINANCING PATTERNS OF HOUSEHOLDS AND CORPORATIONS

The impact of interest and exchange rates on private consumption and real capital investments depends inter alia on the development in the wealth of corporations and households, and the structure of their assets and liabilities.¹

3.2.1 Households

Households borrow mainly from banks and mortgage-credit institutes. At end-2002, mortgage-credit loans accounted for around 80 per cent of borrowing from banks and mortgage-credit institutes, while bank loans accounted for the remaining 20 per cent, cf. Table 3.2.

Households borrow mainly from banks and mortgage-credit institutes.

Households' purchases of real property and large consumer goods items are financed predominantly via mortgage-credit loans. Mortgage-credit loans often have maturities of 20 or 30 years, and for most of these

¹ A compilation of the total financial assets and liabilities of households and corporations for 2001 can be found in Statistics Denmark (2003). From the autumn of 2003 Danmarks Nationalbank intends to publish quarterly financial accounts showing total financial assets and liabilities for the main sectors of the Danish economy. Andersen, Lyngesen and Pedersen (1999) analyse credit extension by banks and mortgage-credit institutes to households and corporations since 1980 and the relation with the business cycle.

BORROWING BY HOUSEHOLDS FROM DANISH BANKS AND MORTGAGE-CREDIT INSTITUTES

Table 3.2

Kr. billion	End-2002
Total mortgage-credit loans	981
Of which ¹ Adjustable-rate loans	289
Fixed-rate loans	692
Bank loans	252
Total loans	1,233

Note: Households include the self-employed. The Table includes lending by banks and mortgage-credit institutes in Denmark and Danish banks' units abroad.

Source: Danmarks Nationalbank.

¹ The breakdown is partly estimated on the basis of the breakdown of mortgage-credit loans by property category and loan type. Fixed-rate loans include index-linked loans.

loans the interest rate is fixed throughout the period. Mortgage-credit loans are, however, usually callable, so that they can be converted to loans at lower interest rates should this prove favourable in connection with falling interest rates. This right is widely used.¹

In recent years, adjustable-rate loans as a proportion of total lending by the mortgage-credit institutes has increased. The rate of interest for these loans is adjusted to the current market terms with an agreed frequency, e.g. annually, although the frequency can be up to 5 years. At end-2002 adjustable-rate loans accounted for around 30 per cent of total lending by the mortgage-credit institutes, against 6 per cent at the end of 1999. Together with borrowing from the banks this implies that almost half of the interest payments made by households are affected by the development in the short-term interest rates.

For the overall household sector, real property is by far the largest wealth asset. The households also hold certain financial assets such as bank deposits and bonds. For most households, net interest expenditure tends to increase when interest rates rise.

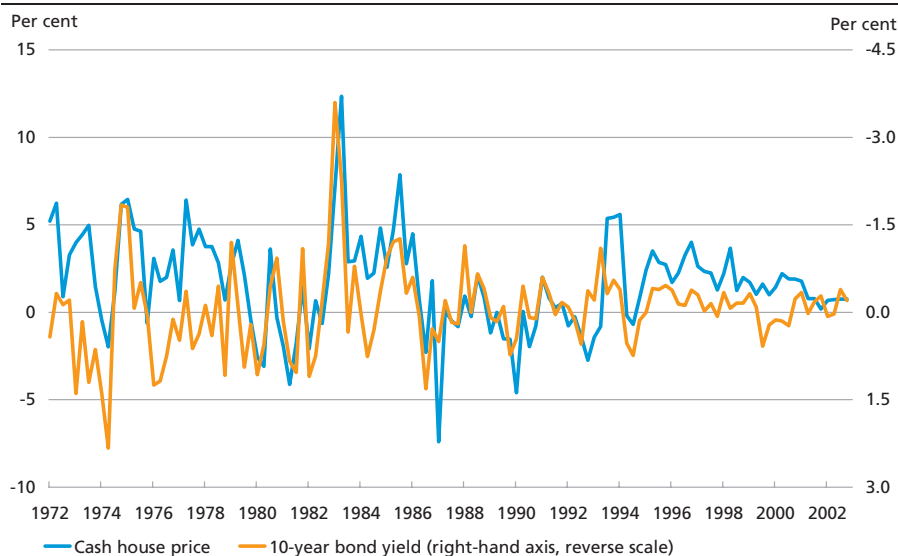
In general terms fluctuations in house prices and in long-term interest rates are related. If long-term interest rates are rising, it becomes more expensive to finance a home purchase, so that house prices will tend to fall. However, Chart 3.7 shows that there is not always a strong co-variation between quarter-on-quarter fluctuations in house prices and in the 10-year bond yield.

For households whose homes are financed with fixed-rate loans, an increase in long-term interest rates will reduce the market value of the debt. Since for most households the property value exceeds the

¹ See e.g. Knudsen (2003) for a discussion of conversions of 30-year mortgage-credit bonds since the mid-1990s.

QUARTERLY PERCENTAGE CHANGES IN HOUSING PRICES AND
QUARTERLY CHANGES IN LONG-TERM BOND YIELDS

Chart 3.7



Source: Statistics Denmark and Danmarks Nationalbank.

housing debt, the deterioration in property value as a consequence of rising interest rates will often exceed the reduction of the debt. This erodes the net housing wealth¹. For households with adjustable-rate loans an increase in interest rates will reduce the market value of the debt by far less than would have been the case with a fixed-rate loan. Interest-rate fluctuations will thus have a stronger impact on net housing wealth.²

Interest-rate fluctuations also affect stock prices. Theoretically, the price of a share is often described as the discounted value of expected future dividend payments.³ The higher the interest rate, the lower the present value of a given future dividend payment. Therefore, stock prices and long-term interest rates will take opposite courses, all other things being equal. However, there is no pronounced relationship in practice, cf. Chart 3.8, which shows the correlation between day-to-day percentage changes in stock prices measured by the KFX index and fluctuations in the 10-year Danish government bond yield. The correlation has been predominantly negative since 1990, but positive for

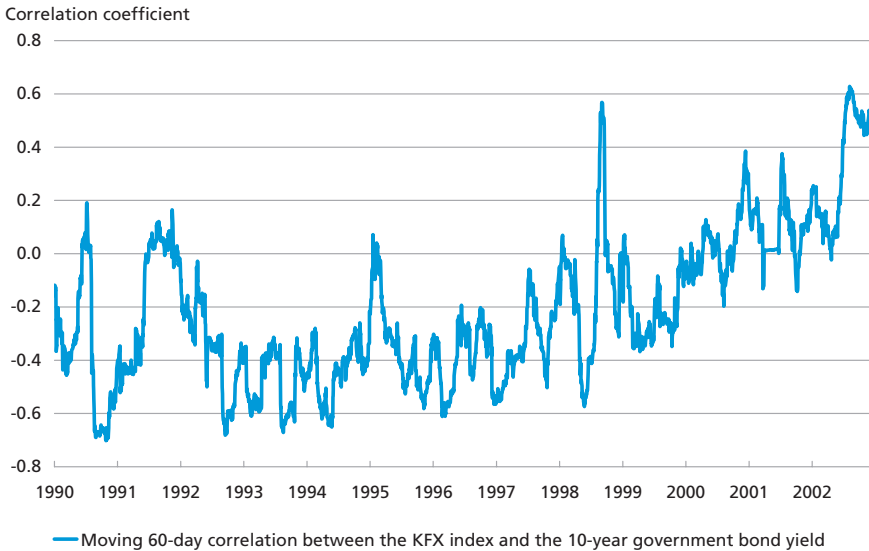
¹ Net housing wealth is the cash value of the home less the cash value of its financing.

² Christensen and Kjeldsen (2002) give a more detailed review of the relations between interest-rate fluctuations and housing wealth with various types of financing.

³ See Saabye (2003) for a description of the pricing of stocks. Pedersen (1998b) and Ejerskov (2000) discuss stock prices and house prices in more general terms, and their impact on prices, consumption, investments and monetary policy.

CORRELATION BETWEEN DANISH STOCK PRICES AND LONG-TERM BOND YIELD

Chart 3.8



Note: The moving average is for 60 business days.

Source: EcoWin and Danmarks Nationalbank.

a prolonged period in recent years. This can be attributed to the impact on stock prices of factors other than interest rates.¹

Empirical analyses indicate that stock-price fluctuations in Denmark have a relatively limited impact on private consumption.² A large proportion of Danish households have only little or no wealth invested in stocks. However, there is more share ownership via mutual funds, and when stock portfolios via pension schemes are included, the wealth of many households will directly or indirectly be influenced by stock-price fluctuations. However, experience shows that fluctuations in stock prices have only a minor impact on the households' consumption behaviour.

3.2.2 Corporations

The primary sources of financing for Danish corporations are the issue of stocks, loans from banks and mortgage-credit institutes in Denmark and abroad, and current earnings. The direct issue of bonds is a minor source of financing.

¹ For example, the dampened economic growth in recent years may have eased inflationary pressure, giving lower interest rates, but it may also have reduced expectations of corporations' future earnings. If this effect is stronger than the discounting effect of the lower interest rates, the relation between stock prices and interest rates becomes positive.

² See e.g. Ludwig and Sløk (2002) for an analysis of the significance of trends in the stock and housing markets to private consumption in a number of OECD countries.

BORROWING BY THE CORPORATE SECTOR FROM DANISH BANKS AND MORTGAGE-CREDIT INSTITUTES

Table 3.3

Kr. billion	End-2002
Total mortgage-credit loans	259
Of which ¹ Adjustable-rate loans	72
Fixed-rate loans	187
Bank loans	308
Total loans	567

Note: The corporate sector is defined as non-financial corporations, including housing companies. The Table includes lending by banks and mortgage-credit institutes in Denmark and Danish banks' units abroad.

Source: Danmarks Nationalbank.

¹ The breakdown is partly estimated on the basis of the breakdown of mortgage-credit loans by property category and loan type. Fixed-rate loans include index-linked loans.

Table 3.3 shows that bank loans account for a considerably larger share of corporations' borrowing from banks and mortgage-credit institutes than is the case for households. One underlying factor could be that the value of the corporate sector's buildings limits their borrowing from mortgage-credit institutes. Furthermore, the interest-rate margin between mortgage-credit loans and bank loans is narrower for corporations than for households.

It is difficult to determine the sensitivity of corporations to fluctuations in interest rates for loans with different maturities solely on the basis of the structure of their borrowing, as the corporation may adjust the sensitivity via various financial instruments. For example, a corporation may convert a fixed-rate loan to a floating-rate loan via an interest-rate swap, cf. Chapter 2.

Corporations' debt consists primarily of borrowing from banks and mortgage-credit institutes in Denmark and abroad.

Corporations may use other sources of financing than bank and mortgage-credit loans, such as the issue of shares. A rising stock price will, all other things being equal, make it more attractive for the corporation to issue shares to finance investments in new real capital.

3.3 THE IMPACT OF INTEREST AND EXCHANGE RATES ON THE REAL ECONOMY

Changes in interest and exchange rates influence the future course of prices, output and employment. Higher interest rates and/or a strengthening of the effective krone rate will, all other things being

TRANSMISSION CHANNELS

Box 3.1

The economic literature identifies a number of transmission channels for the impact of interest and exchange-rate fluctuations on economic activity. The number and delineation of the channels vary, like the time perspective, and the channels should not necessarily be perceived as independent. This box distinguishes between four channels.

Investment channel. The rationale behind the investment channel is that falling interest rates reduce the cost of borrowing for investment in real capital such as business investments in machinery and buildings and households' housing construction. When investments increase, economic activity will grow, and prices will tend to rise.

Consumption channel. Interest-rate changes the wealth of the private sector. The most simple effect is via price changes for private bond portfolios, but there is also an indirect effect via possible changes in stock-prices and in the value of the housing wealth. Should e.g. interest rates decrease and the households' wealth increase, a part of the added wealth will be translated into private consumption. In addition, the interest rate has direct impact on private consumption, since net interest income is included in disposable income.

Exchange-rate channel. If the effective krone rate declines, Danish products will all other things being equal become cheaper abroad, as the price in foreign currency decreases. The price in Danish kroner for goods manufactured abroad will all other things being equal increase. In so far as the direct impact on prices is not offset by changes in producer prices in Denmark and abroad, exports will tend to rise and imports will tend to fall. This will enhance economic activity and lead to a general increase in domestic prices both directly via higher import prices and indirectly via the expansion in activity.

Credit channel. The interest rate is not the only parameter to be considered by e.g. a bank as the basis for its lending decisions. Since the information on the borrower's ability to repay a loan is incomplete, the bank has to evaluate the creditworthiness of the borrower in question. The borrower's creditworthiness may increase when interest rates fall. This can be attributed to a reduced interest burden and an increase in the wealth of the borrower, e.g. in the form of a higher free mortgagable value of the borrower's owner-occupied home. A higher creditworthiness makes it easier to negotiate a loan for consumption or investment in real capital.

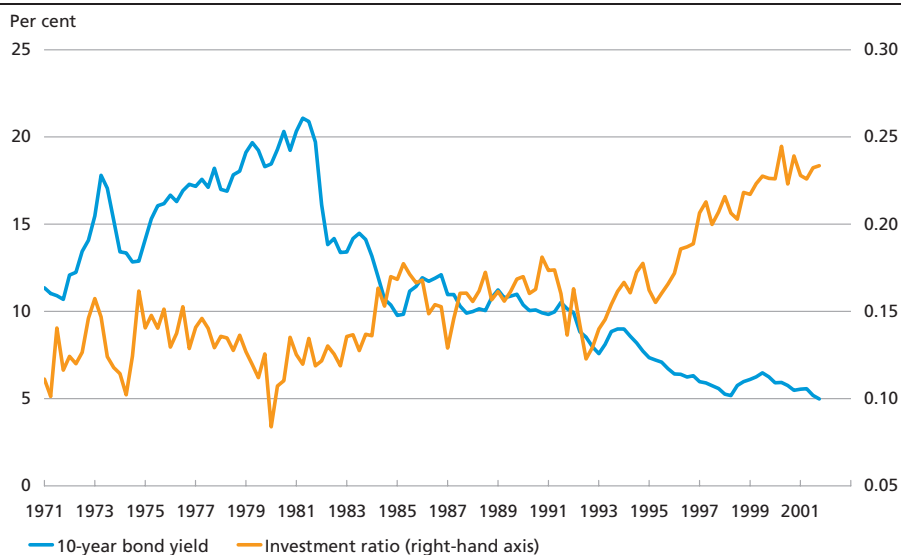
equal, tend to dampen economic activity and inflation, while lower interest rates and/or a weakening of the effective krone rate will have the opposite effect.

The theoretical and empirical literature on the effect of changing interest and exchange rates on the economy often distinguishes between a number of different channels via which changes in interest and exchange rates affect economic activity, cf. Box 3.1.¹ The channels are described in the following by means of general, empirical relations

¹ More recent discussions of the issue and literature are found in e.g. Angeloni et al. (2002), ECB (2000 and 2002), Kuttner and Mosser (2002) and van Els et al. (2001).

LONG-TERM BOND YIELD AND INVESTMENT RATIO

Chart 3.9



Note: The investment ratio is calculated as private business investments in machinery and means of transportation as a ratio of the gross domestic product at factor prices. The long-term bond yield is quarterly averages of daily observations.

Source: Statistics Denmark and Danmarks Nationalbank.

from the development in interest rates and exchange rates to key real-economic quantities such as investment, consumption and foreign trade.

3.3.1 Real-capital investments

Theoretically, a negative relation can be expected between long-term interest rates and business investments in plant and equipment, since a fall in interest rates reduces the costs of borrowing to finance investments. This appears to be confirmed in Chart 3.9. However, the relation is less clear in certain periods as investment decisions are also influenced by other factors besides the development in interest rates, such as expected sales.¹

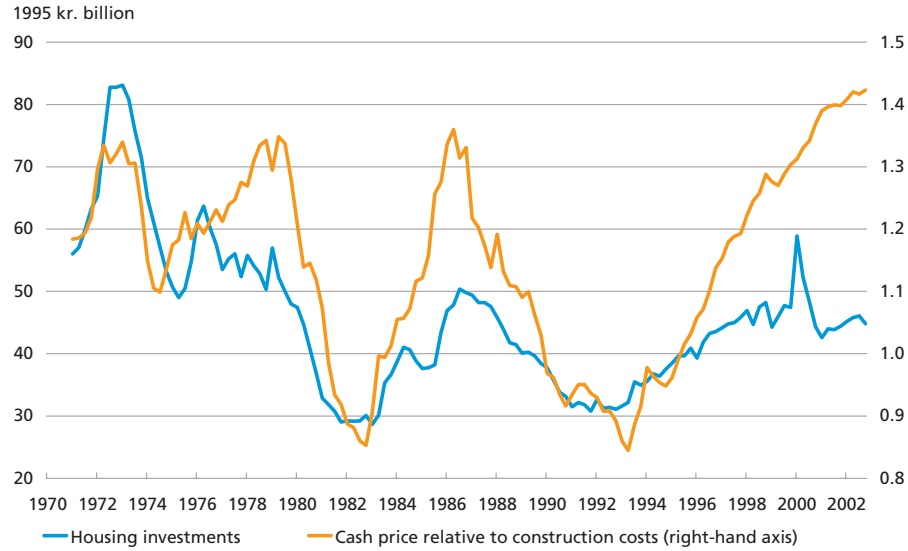
Housing construction and the business sectors' investments in plant and equipment increase when interest rates decrease.

Housing investments are also influenced by interest rates via the effect on the costs of new construction compared to purchasing existing real

¹ In theory, the real-interest rate is the relevant interest rate, rather than the nominal interest rate. Assuming rigid wage and price developments, at least in the short term, and considering the taxation system, results in a more complex problem, cf. Pedersen (2001) and Knudsen (2002).

CASH PRICES, CONSTRUCTION COSTS AND HOUSING INVESTMENTS

Chart 3.10



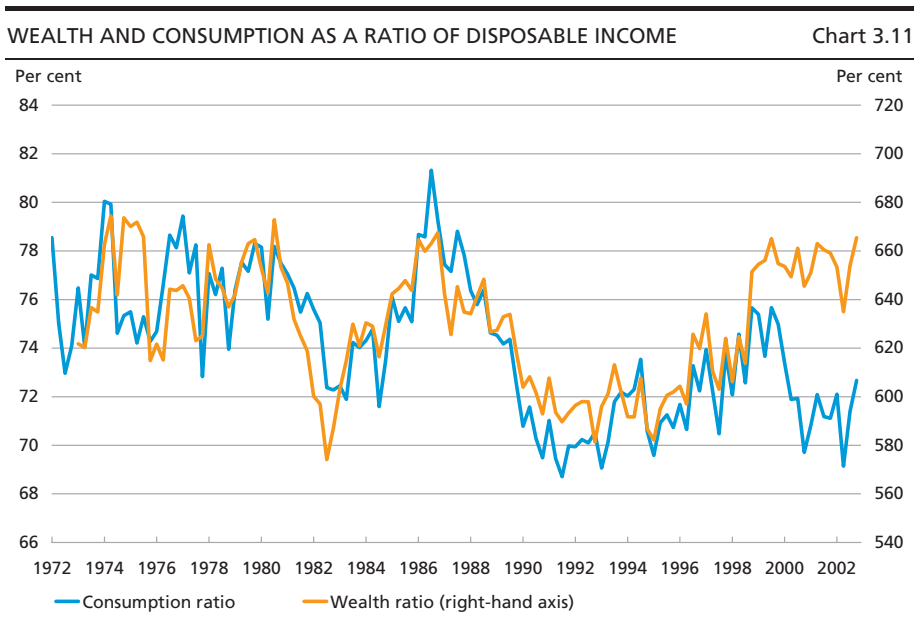
Source: Statistics Denmark.

property. A drop in interest rates often leads to higher cash prices, cf. Chart 3.7. An increase in the cash price for real property makes new construction relatively cheaper than purchasing an existing property. This stimulates housing investments, cf. Chart 3.10.

3.3.2 Private consumption

In theory, interest rates have a direct impact on private consumption by influencing the timing of the individual households' consumption and by changing the households' disposable income. If interest rates fall, it becomes cheaper to finance consumption today, whereby present consumption increases to the detriment of savings (the substitution effect). At the same time, the disposable income of debt-burdened households will increase, which will tend to further increase present consumption (income effect).

However, empirical studies indicate that consumption patterns are mainly influenced by other factors than interest rates. Changes in the private sector's wealth, primarily housing wealth, is by far the single most significant explanation for the variation in consumption as a ratio of disposable income, as wealth owners translate a proportion of a change in wealth into private consumption. However, the relation has been less pronounced since the reduction of the tax deductibility of interest payments introduced with the Whitsun Package of Economic



Source: Statistics Denmark and Danmarks Nationalbank.

Measures in 1998. After 1998, housing prices have increased considerably, while private consumption has been more subdued, cf. Chart 3.11.

A decline in interest rates especially affects private consumption via changes in the private sector's wealth, primarily housing wealth.

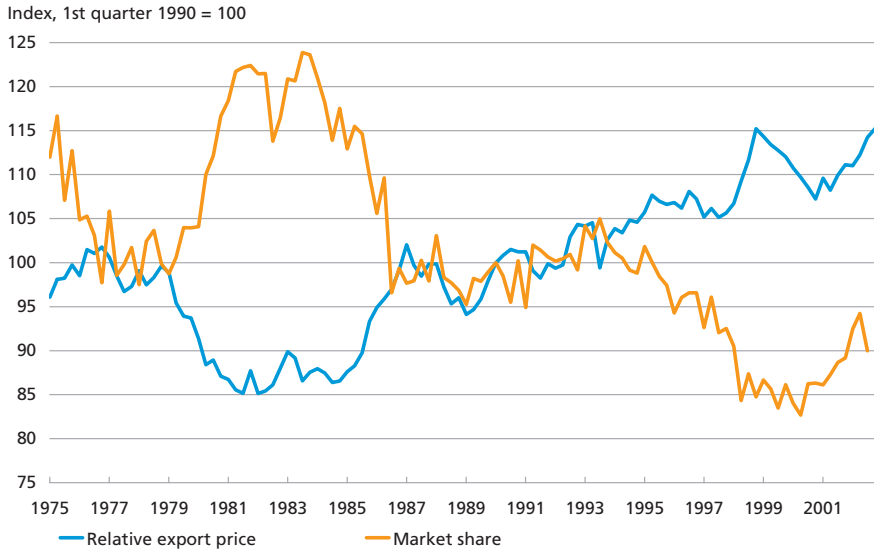
3.3.3 Foreign trade

A decline in the effective krone rate will, all else being equal, make Danish goods cheaper abroad, as the price in foreign currency becomes lower. The price in Danish kroner of goods manufactured abroad will increase. In so far as the direct effect on prices is not offset by changes in producer prices in Denmark and abroad, the volume of exports will tend to increase, while the volume of imports will decrease. This will stimulate economic activity and will induce upward pressure on domestic prices, both directly via higher import prices, and indirectly via expanded activity.

It is difficult to establish a close empirical relation between the course of the effective krone rate and that of imports and exports. The principal reason is that the volume of foreign trade normally reacts sluggishly to relative price changes between goods manufactured in Denmark and abroad, while the development in the size of the market,

DANISH EXPORT MARKET SHARE AND RELATIVE EXPORT PRICE

Chart 3.12



Note: The market share is Denmark's manufactured exports as a ratio of the size of Denmark's export markets. The size of Denmark's export markets is calculated as a weighted average of the imports of Denmark's trading partners. The relative export price is the price for Danish exports in relation to the competing price in the individual markets, weighted by market size in Danish exports.

Source: Danmarks Nationalbank and Statistics Denmark.

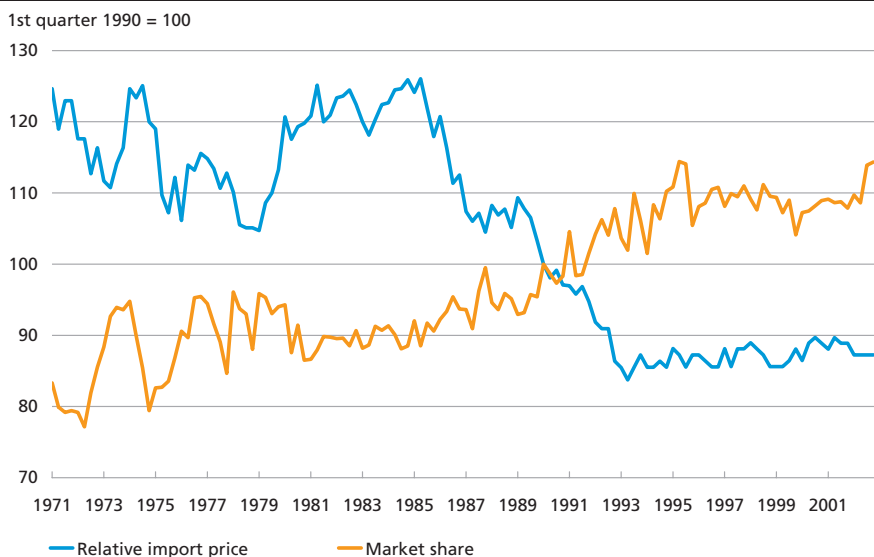
including cyclical trends, plays a key role. Moreover, in the short term, the relative price development has only a minor impact on determining the market shares of imports and exports. A further complication is that exporters and importers also change their prices when the exchange rate changes, which offsets the direct price effect of the exchange-rate change.¹ For example, experience shows that Danish exporters typically raise the price (in Danish kroner) to match the world-market price when the krone weakens. Similarly, foreign exporters often lower the price in their own currency when the krone weakens. Exporters and importers may at the same time conclude forward foreign-exchange contracts in order to cushion some of the effects of future exchange-rate fluctuations.

Chart 3.12 shows the development in the market share for Danish exports of manufactured goods together with the relative Danish export price. If Danish export prices rise, whereby Danish goods become more expensive abroad, the market share is assumed to decline. In some periods this relation is less obvious, as other factors carry more weight than the development in relative export prices, cf. Nielsen (1999).

¹ See e.g. Devereux, Engel and Storgaard (2002).

RELATIVE IMPORT PRICE AND IMPORT MARKET SHARE

Chart 3.13



Note: The relative import price is the price for imports to Denmark in relation to the deflator for value added in the private, non-agricultural sector in Denmark. The market share reflects imports to Denmark of goods, excluding energy, ships and aircrafts in relation to domestic demand for these goods.

Source: Danmarks Nationalbank and Statistics Denmark.

Chart 3.13 shows the import market share in Denmark and the relative import price. As before, a negative relation between the import price and the market share in Denmark should be expected.

A weakening of the krone normally causes exports to rise and imports to fall.

3.4 EFFECTS OF INTEREST AND EXCHANGE-RATE CHANGES ON GDP AND CONSUMER PRICES

The following seeks to quantify how interest and exchange-rate changes influence economic growth and inflation using Danmarks Nationalbank's macroeconomic model (Mona¹).

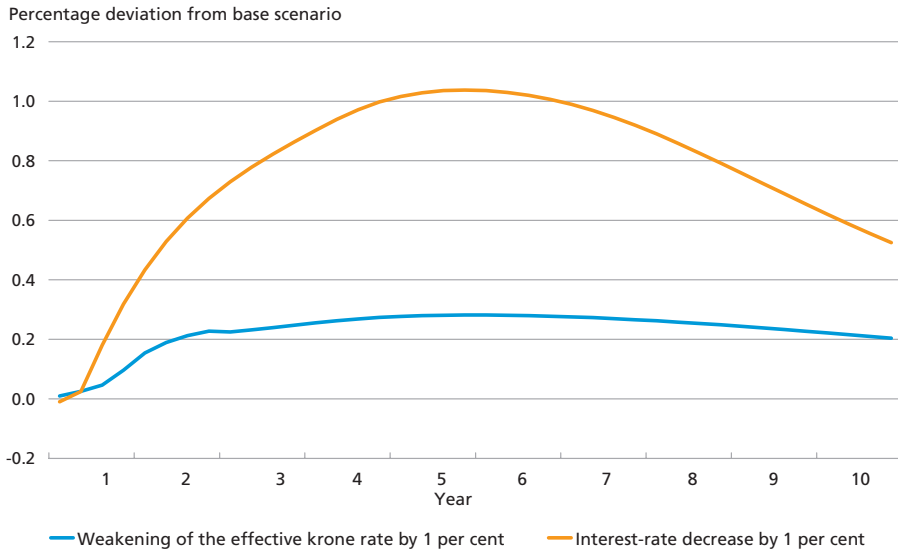
Section 3.4.1 first illustrates the real-economic effects of an isolated decline in Danish interest rates and an isolated weakening of the effective krone rate.

An experiment based on changes only in Danish interest or exchange rates may appear very theoretical in the light of Denmark's fixed-

¹ Mona is described in Christensen and Knudsen (1992) and Danmarks Nationalbank (2003). Setting up monetary and financial condition indices is an alternative method to quantify the impact of interest and exchange-rate changes on the real economy, cf. Hansen (1997).

EFFECT ON GDP IN CONSTANT PRICES

Chart 3.14



Source: Danmarks Nationalbank.

exchange-rate policy. However, the calculations illustrate the extent of the real-economic effects of "shocks" to interest and exchange rates respectively. As a supplement, section 3.4.2 describes calculations of the effects of an increase in the euro area's monetary-policy interest rates followed by a corresponding raising of the monetary-policy interest rates in Denmark.

3.4.1 The effects of isolated changes in Danish interest and exchange rates

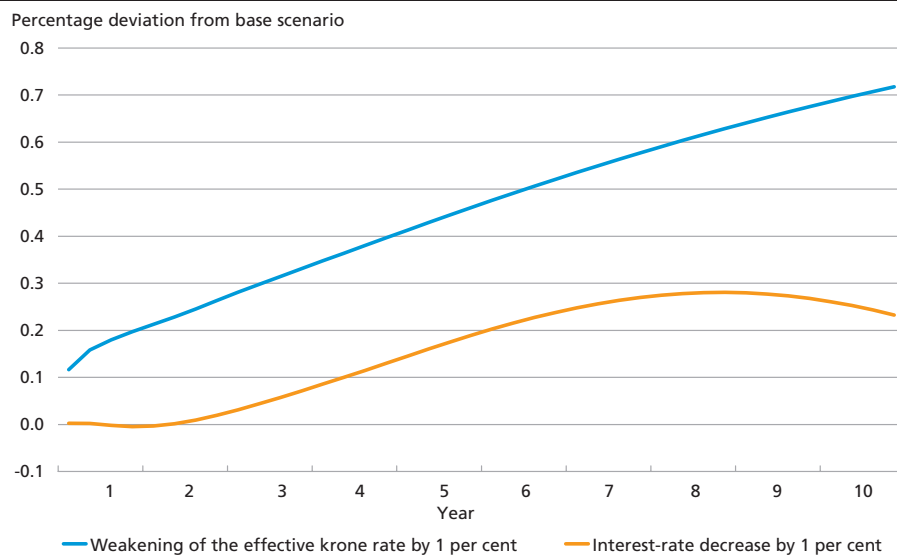
The interest-rate experiment specifically assumes a permanent decrease in interest rates (before tax) by 1 percentage point for all maturities. In the calculation of the effect of a change in exchange rates a permanent decrease in the krone rate by 1 per cent vis-à-vis all other currencies is assumed (corresponding to a decrease in the effective krone rate by 1 per cent). The calculations are made in relation to a 10-year base scenario.

A decline in interest rates and a weakening of the effective krone rate both have a positive impact on economic activity. For both experiments, Chart 3.14 shows the impact on GDP over time compared to a given base scenario.

An expansionary GDP effect is seen on a drop in interest rates by 1 per cent. The effect peaks after 4-6 years, when GDP is approximately 1 per

EFFECT ON CONSUMER PRICES

Chart 3.15



Source: Danmarks Nationalbank.

cent higher than in the base scenario.¹ After this time, the effect gradually subsides. The experiment where the krone rate weakens shows a more moderate total impact on GDP.

The effects on activity in the interest-rate experiment can be attributed primarily to private consumption via the housing market, while the activity effects in the exchange-rate experiment can be attributed mainly to exports via improved competitiveness.

The effect on consumer prices is far more pronounced in the exchange-rate experiment than in the interest-rate experiment, cf. Chart 3.15. A weakening of the krone rate immediately affects consumer prices via import prices, which is the principal reason for the somewhat more pronounced price effect. In addition, wage costs rise as a result of increasing activity and employment, whereby prices go up. The price effects of a decrease in interest rates can be attributed primarily to higher wage costs, causing prices to rise.

3.4.2 The effects of a temporary increase in interest rates in the euro area and Denmark

The calculations assume that the ECB raises the monetary-policy interest rates in the euro area by 1 per cent for 2 years, compared to a base

¹ This could result in a rule of thumb to the effect that over a period of some years an interest-rate decrease by 1 per cent causes GDP to rise by approximately 1 per cent. This conclusion is also reached in Knudsen (1993).

EFFECTS OF A TEMPORARY INTEREST-RATE INCREASE IN THE EURO AREA AND DENMARK

Table 3.4

	1st year	2nd year	3rd year	4th year	5th year
	Percentage deviation from basic scenario				
GDP	-0.13	-0.22	-0.18	-0.12	-0.07
Private consumption	0.03	-0.12	-0.16	-0.15	-0.12
Investment	-0.35	-0.81	-0.62	-0.28	-0.04
Exports	-0.36	-0.32	-0.17	-0.08	-0.02
Imports.....	-0.21	-0.38	-0.26	-0.11	-0.02
Consumer prices	-0.21	-0.20	-0.16	-0.17	-0.19

Source: Danmarks Nationalbank.

scenario. Danmarks Nationalbank is assumed to follow suit with a parallel increase in the monetary-policy interest rates in Denmark in view of the fixed-exchange-rate policy. After the two years the monetary-policy interest rates return to the original level in both the euro area and in Denmark.¹

The raising of the monetary-policy interest rates in the euro area is not expected by the market in advance. However, the market is assumed to correctly expect the monetary-policy interest rates to return to the original level after 2 years. This brings an immediate increase in the 10-year bond yield by around 0.20 percentage points.² The krone follows the euro, and the two currencies are assumed to appreciate by 2 per cent vis-à-vis all other currencies. This effective krone rate thus appreciates by 0.85 per cent, cf. also the weights in the effective krone rate in Table 3.1. Both long-term interest rates and the effective krone rate are back at the original level after the two years.

The experiment also e.g. considers that the interest-rate increase and the euro's appreciation dampen growth in the euro area, resulting in lower growth in Danish exports to the euro area.

Table 3.4 summarises the calculations. The higher long-term interest rates lead to falling house prices, which has a negative impact on private consumption. Exports are reduced as a result of the appreciation of the effective krone rate and reduced demand in the euro area. The overall impact on GDP for the first five years is negative compared to the base scenario.

The krone's appreciation leads to falling consumer prices immediately after the interest-rate increase. Furthermore, the reduced economic

¹ This interest-rate change and its consequences for the euro area are described in van Els et al. (2001). These results are used as input to the calculations in Mona. The experiment with Mona is described in further detail in Danmarks Nationalbank (2003).

² Since the rate of interest is 1 percentage point higher in two years out of 10 compared to the base scenario.

activity contributes to falling wage levels, which in turn contributes to falling consumer prices in subsequent years compared to the base scenario.

For a horizon beyond 5 years the lower wage increases will gradually contribute to a renewed upswing in activity, after which GDP and consumer prices gradually return to the base scenario.

Comparison with similar surveys for the euro area member states shows that the Danish economy is generally less sensitive to fluctuations in short-term interest rates than most other economies.¹ This can be attributed to the relatively widespread use of financing at fixed interest rates in Denmark.

¹ See e.g. van Els et al. (2001).

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CHAPTER 4

Monetary-Policy Strategies

The monetary-policy strategy is the link between the monetary-policy instruments and the monetary-policy objective.

In many countries the objective of monetary policy is to maintain price stability, which is generally taken to mean very low and stable inflation. In pursuance of this objective, many central banks in practice make use of an intermediate target. Examples of intermediate targets are the exchange rate, the monetary development and inflation targets.

Under Denmark's fixed-exchange-rate policy, the intermediate target of monetary policy is the exchange rate vis-à-vis the euro. Danmarks Nationalbank pursues a monetary policy that ensures a stable krone rate vis-à-vis the euro.

Central banks conduct monetary policy using monetary-policy instruments, most often a short-term interest rate. The most important interest rates in Danmarks Nationalbank's monetary-policy instruments are the discount rate, the current-account rate and the lending rate. The latter is equal to the interest rate for certificates of deposit.

Monetary-policy performance is also affected by other factors besides the elements of the monetary-policy strategy. Central banks' independence of the political system in the implementation of monetary policy is considered to play an important role. This creates the best conditions for price stability. Like most other central banks, Danmarks Nationalbank is an independent central bank.

Sustainable fiscal policy and a clear division of labour in economic policy enable the central bank to better fulfil its objective. In Denmark, the division of labour is explicitly stated: the monetary policy is aimed at ensuring a stable krone vis-à-vis the euro, while stabilising domestic economic development rests with fiscal policy.

In the last decades, monetary policy has become more transparent. Central banks now issue more information than before regarding their tasks, objectives and decisions. This enables the outside world to gain more insight into monetary-policy decisions.

Credibility is another important factor for a successful monetary policy. Irrespective of whether the objective is to stabilise the exchange rate or to reach e.g. an inflation target, the success of the policy depends on general public confidence that the central bank can and will pursue the chosen strategy.

4.1 OBJECTIVES

It is generally accepted that the overall objective of economic policy should be to ensure a high standard of living. A high rate of employment, sustained high economic growth and price stability are often specifically cited as objectives for macroeconomic policy, of which monetary policy and fiscal policy are elements.

In many countries, an independent central bank is responsible for monetary policy.¹ The historical background to the separation of monetary policy from the political system was the limited success with the same institution being responsible for central-government expenditure and for monetary policy.² There are numerous examples of how public spending was financed via the central bank's printing of more and more banknotes. In these cases, the consequence of monetary financing was often that money lost its value due to high inflation.

Politicians have sought to maintain citizens' confidence in the issue of money by assigning the responsibility for monetary policy to the central bank. In connection with the delegation of tasks a framework is drawn up for the central bank's functions, often as a central bank act, of which the monetary-policy objective is an important element. The overall objective of monetary policy is defined at the political level, but there is variation in the degree to which the central bank determines the more specific objective, cf. e.g. Cukierman (1998).

As the central bank of Denmark, Danmarks Nationalbank is responsible for monetary policy, including determining the monetary-policy interest rates and designing the monetary-policy instruments. This responsibility is stated formally in the Danmarks Nationalbank Act of 1936. The Act also stipulates that Danmarks Nationalbank shall be the sole issuer of banknotes. According to the Danmarks Nationalbank Act, the objective of Danmarks Nationalbank is "to maintain a safe and secure currency system and to facilitate and regulate the circulation of money and the extension of credit". The Act empowers Danmarks Nationalbank to work to stabilise the purchasing power of the krone.³ At the same time, Danmarks Nationalbank must contribute to the smooth and stable functioning of the financial system.

¹ This chapter considers only selected OECD countries. Mahadeva and Sterne (2000) give a more detailed review of monetary-policy and foreign-exchange-policy strategies. The website of the Bank for International Settlements, www.bis.org, is a good source of information on central banks worldwide, and gives links to the central banks' websites.

² Central-bank independence is discussed in more detail in Section 4.4.1.

³ During the first reading of the bill Trade Minister Hauge said as follows concerning the first part of the objective: "A safe and secure currency system means that exchange rates will be kept stable in so far as this is possible for the bank and society" (Rigsdagstidende, Deliberations of the Folketing (Parliament), 1933-34, col. 4472).

A well-functioning financial system facilitates desired transactions. This ensures that the savings and investment financing planned by private individuals and business enterprises can be transacted smoothly without being impeded by shortcomings in the functioning of the financial markets.

The objective of stabilising the purchasing power of the krone is pursued via monetary policy aimed at stabilising the value of the krone vis-à-vis the euro. A credible stability-oriented monetary policy also provides a framework for a stable financial system.

The overall objective of Danmarks Nationalbank is to ensure a stable krone rate.

In recent years many central banks have given greater weight to the objective of price stability. According to the provisions forming the framework for the European System of Central Banks (ESCB¹), the primary objective is to maintain price stability.² Without prejudice to price stability, monetary policy may also be arranged to support the general economic policies in the Community.

The objective of the Bank of Japan is to manage the monetary development.³ Via the pursuit of price stability the purpose is to contribute to sound development in the Japanese economy. The Bank of Japan is also responsible for ensuring the smooth settlement of funds between financial institutions and thereby contributes to maintaining an orderly financial system.

The statutory objective of the US Federal Reserve system is to promote maximum employment, stable prices and moderate long-term interest rates.⁴

According to the most recent Sveriges Riksbank Act, which entered into force in 1999, the objective of monetary policy is to maintain price stability.⁵ Furthermore, Sveriges Riksbank shall also promote a safe and efficient payment system.

The objective of the Bank of England is to maintain price stability. Subject to this objective, the Bank of England shall support the govern-

¹ The ESCB consists of the European Central Bank, ECB, and the national central banks of the EU member states.

² Article 105 of the EC Treaty and Article 2 of the Statute for the European System of Central Banks and the European Central Bank. The Treaty and the Statute entered into force on 1 November 1993.

³ The Bank of Japan Act, Articles 1 and 2. The Act entered into force on 1 April 1998, and was last amended in 2001.

⁴ US Code, Title 12, Chapter 3, Section 225a. The Act of 23 December 1913.

⁵ The Sveriges Riksbank Act (1988:1385), Chapter 1, Section 2.

ment's economic policy, including its objectives for growth and employment.¹

These examples show that price stability is the primary objective of the central banks in most of the countries. However, they also reveal variation in the degree to which the central bank must plan its policy according to real-economic targets such as growth and high employment. In the Federal Reserve Act, the objective of maximum employment is thus ranked alongside the objective of price stability, while the ESCB statute and the Bank of England Act place the objective of price stability above the real-economic objectives.

There are many arguments in favour of focusing on price stability in the sense of stable, low inflation. The fundamental argument is that there is basically only one monetary-policy instrument available. Monetary policy can therefore be used to pursue one objective only. If monetary policy is used to pursue several objectives, it will not generally be possible to meet these objectives at the same time, so that a weighting of the objectives is required, cf. the classical analyses of Tinbergen (1952) and Theil (1961). Non-compliance with the objectives is naturally a problem in itself, but may also undermine the credibility of monetary policy.

The motivation for price stability as the overall monetary-policy objective is the relationship between money creation and price development, as well as the advantages of low, stable inflation. In the longer term, monetary growth and the rate of price increase (inflation) are closely interdependent, but in the shorter term the relationship is not one-to-one.² This relation has given rise to the (monetarist) view that inflation is fundamentally a monetary phenomenon.

The arguments in favour of price stability as an objective are described in further detail in Box 4.1. Firstly, high inflation usually means varying inflation, which impedes forward-looking savings and investment decisions. Another cost of high inflation is that an unexpectedly high rate of inflation may entail redistribution of wealth between debtors and creditors. Furthermore, high inflation makes it more difficult to determine the part of a given price increase that is attributable to increases in the general price level, and the part attributable to the product in question becoming more expensive in relation to other goods. The price mechanism, which is central to the functioning of market economies, is thus working less well than in a situation with low inflation. Finally, high inflation may lead to less appropriate interaction with the taxation system if the tax base is compiled in nominal

¹ The Bank of England Act 1998, Section 11.

² Walsh (1998, Chapter 1) reviews the basic empirical relations between money supply, prices and output.

WHY LOW INFLATION?¹

Box 4.1

In the 20th century countries such as Argentina, Brazil, Chile, Israel, Russia and Germany experienced economic collapse and radical economic measures to combat very high inflation rates. The citizens of these countries found that savings were of little value, and that money ultimately lost its value as a unit of account and a means of payment. This can lead to currency substitution, i.e. extensive use of foreign currency instead of the local currency, whereby the country's own money loses significance, cf. e.g. Dalsgaard and Pedersen (1996).

There are many empirical analyses of the costs of inflation based e.g. on the experience with stagflation in the 1970s. The overall impression is that inflation has detrimental effects, in particular through a negative relation between inflation and economic growth. However, it is difficult to determine exactly where inflation becomes truly costly. The results of the empirical analyses are not unequivocal. They also document that combating inflation can be costly in the short term, especially if inflation is already low, and a hard line on inflation can reduce employment.

Inflation is problematic since it tends to acquire its own dynamics. There is a risk that even moderate inflation can get out of control. In addition, there are several theoretical arguments:²

- When inflation is high, it fluctuates more. The relation is by no means 1:1, but it can be seen that when inflation is high, its variation is also strong. Fluctuating inflation leads to uncertainty about future inflation. In other words, debtors fear that high inflation will cease, while creditors fear that it will last or rise. One cost of fluctuating inflation is that the level of interest rates tends to rise, since the uncertainty leads to a risk premium. This is a direct cost that dampens investment and economic activity.
- Inflation tends to redistribute wealth randomly. Unexpectedly high inflation results in a redistribution of wealth that seems unfair. Gains and losses due to inflation reflect luck or ability to benefit from inflation, rather than actual work effort. This also means that the considerable resources devoted to exploiting inflation represent wasted resources from a macroeconomic perspective.
- High inflation makes it more difficult to distinguish between changes in relative prices and changes in the general price level. If consumers and business enterprises cannot distinguish changes in the general price level from changes in the prices for individual products, decisions on production, consumption and investment will be based on inaccurate information. This moreover creates uncertainty among households, business enterprises and (foreign) investors.
- Inflation amplifies the distorting element in typical taxation systems where some tax sources are stated in real terms and some in nominal terms. If e.g. nominal investment income is subject to a given tax rate, an increase in inflation will reduce the real yield after tax on nominal-yield assets, even though the real yield before tax remains unchanged.³

When price stability is the objective, it seems natural to define it as zero inflation. Nevertheless, absolute price stability is rarely called for. In practice, many central banks consider inflation of around 2 per cent annually to be compatible with price stability.

It is thus not possible to keep prices constant over time. For example, inflation tends to rise during an economic upswing. It would be particularly costly if price increases during an upswing were afterwards to be offset by decreases. Experience shows that wages and many prices are rarely reduced, making it difficult to carry back the actual wage and price increases. Flexibility in real wage development is also important, so that it can adapt to larger fluctuations in e.g. productivity. It is generally believed that this adjustment is easier with a certain rate of inflation.

In addition, measuring inflation is associated with several practical problems. The general price level needs to be defined, among other factors. The consumer price index is a frequently used measure. It is a weighted index of the development in the prices for a representative selection of the goods purchased by households. The consumer price index includes VAT and other indirect taxes, so that changes in indirect taxes affect the general price level. Furthermore, the consumer price index may overestimate the actual price increases in relation to a cost-of-living index that considers substitution for cheaper products and the welfare gains generated by new products. This is discussed in further detail in e.g. Boskin et al. (1998).

¹ Described in further detail in e.g. Pedersen and Wagener (2000).

² Briault (1995) presents an overview of empirical studies of the costs of inflation. The article also reviews some theoretical arguments concerning the costs of inflation.

³ The interaction between inflation and the tax system is examined in e.g. Feldstein (1999).

terms, since the real return after tax will then depend on the inflation rate, cf. Kjeldsen and Pedersen (2002).

Most central banks have price stability as their main objective.

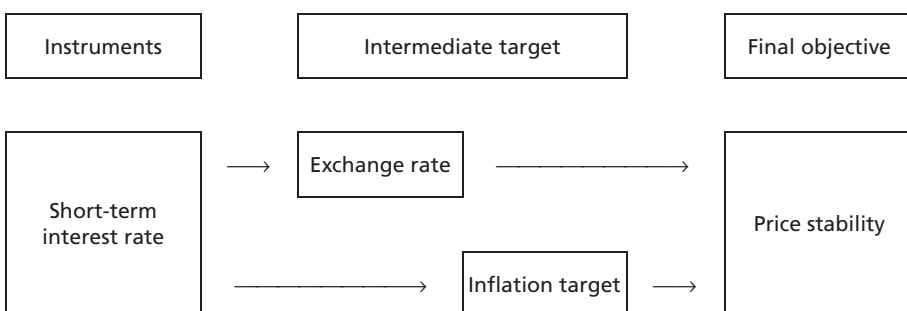
4.2 INTERMEDIATE TARGETS

Intermediate targets are often applied in the implementation of monetary policy. The explanation is that the overall objective of price stability is not immediately operational due to the indirect relation between the monetary policy pursued and price stability. It may take some time for a monetary-policy measure to impact on price development, or for a trend requiring monetary-policy intervention to impact on the price level.¹ Furthermore, monetary policy alone cannot fulfil the objective, since price development is also influenced by many other factors. For example, an excessively expansionary fiscal policy may create bottlenecks and inflation shocks; inflation may be imported from trading partners in general, or via the development in prices for specific products such as oil; and inflation may acquire its own self-sustaining dynamics due to the labour-market structures.

¹ How a monetary-policy measure is transmitted through the economy is often referred to as the monetary-policy "transmission mechanism", cf. Chapter 3.

In practice, the choice of monetary-policy intermediate target applied to meet the objective of price stability will vary. Examples of intermediate targets are the exchange rate (applied in Denmark), a monetary aggregate or a more direct measure of inflation in the medium term.

As the basis for discussion, the intermediate target can be regarded as the link between the instruments applied in monetary policy and the objective(s) that the central bank wishes to achieve.¹ Intermediate targets may so to say lie at various points in the chain between instruments and objectives. Some intermediate targets lie closer to the instruments, whereby it is easier to ensure compliance with the intermediate target by adjusting the instruments. Other intermediate targets lie closer to the final objective, so that compliance with the intermediate target very much contributes to meeting the final objective. In overall terms, exchange-rate targets are normally close to the instruments, while inflation targets are close to the final objective, cf. the illustration below. Monetary aggregates generally lie between the two other types of intermediate target in the chain between instruments and final objectives.



An intermediate target is basically an economic variable with certain special features. It is important to ensure a clear relation between instrument and intermediate target, and that the intermediate target can contribute to meeting the long-term objective. The intermediate target should be operational and preferably simple and easy to understand.

A central function of the intermediate target is to serve as the economy's "nominal anchor". In an economy where money is used as a means of payment, a unit of account and for savings, it is important to have a clear point of reference for the value of money that is also future-oriented. A credible intermediate target is the foundation for the future value of money on which households and business enterprises can base their savings and investment decisions. This anchoring of the inflation expectations also contributes to stabilising the current development

¹ The monetary-policy instruments are discussed in Section 4.3.

in prices and wages.¹ The ability of an intermediate target to function as a nominal anchor critically depends on a close relation between the intermediate target and the long-term objective of price stability.

It is important that the central bank has the opportunity to influence the course of the intermediate target by applying the monetary-policy instruments. The credibility and relevance of an intermediate target will vanish unless the central bank can contribute to ensuring compliance.

The simpler the intermediate target, the more transparent the monetary policy. When the central bank implements monetary policy by pursuing a simple, specific intermediate target the outside world's real understanding of monetary policy is enhanced. The transparency of monetary policy is further enhanced if it is possible for everybody to directly monitor the actual development in the intermediate target, and thereby assess compliance.

Structural factors in the economy may also influence the quality of a given intermediate target for a given country. An obvious example is the economy's openness to the outside world. In a very open economy where imported goods carry great weight in the (consumer) price index, the exchange rate will be relatively important to inflation. Furthermore, the exchange rate will be of significance to profitability and wage trends in exporting enterprises. The openness of the economy can therefore make the exchange rate especially important to the development in prices, and make it more attractive to pursue an exchange-rate target as an intermediate monetary-policy target.

Most countries rarely change their intermediate monetary-policy target. A natural consequence of the central position of the intermediate target in a monetary-policy strategy is that significant adjustment of the intermediate target will imply a shift in strategy, which may have a destabilising effect on the economy. If the intermediate target is to function as a nominal anchor, the outside world must be able to trust the central bank to implement monetary policy with a view to compliance with the intermediate target. The most reliable method to achieve this credibility is to do to what one has promised to do over many years. This naturally requires an unchanged intermediate target. The application of intermediate targets is thus associated with some sluggishness. In practice, intermediate targets have often been adjusted as a result of monetary-policy and/or foreign-exchange-policy crises where the authorities have been obliged to introduce monetary-policy reforms.

¹ See e.g. Clarida, Galí and Gertler (1999) for an analysis of monetary policy in (neo-Keynesian) economic models featuring a relation between current and expected future inflation.

It is most often government or parliament that determines the overall objective for the central bank, as described above, while the institution determining the intermediate target varies more in international terms. Monetary aggregates are often determined by the central bank, while inflation or exchange-rate targets may be determined by either the central bank or the government, or both, cf. Mahadeva and Sterne (2000, Chapter 3).

4.2.1 DENMARK AND THE FIXED-EXCHANGE-RATE POLICY

Danmarks Nationalbank's overall objective is to ensure a stable krone, and the intermediate target of monetary policy is to keep the krone stable vis-à-vis the euro.¹

Chart 4.1 shows the relation between the exchange rate and prices in Denmark and Germany.

In the long term, it does not make much difference whether the monetary-policy strategy is directed at the domestic or international purchasing power of the krone. With a credible intermediate target of a fixed krone rate vis-à-vis a partner with low inflation, domestic inflation will normally also be low.²

The relation between prices and exchange rates is not least a result of Denmark being a small, open economy. There is a considerable foreign element in price formation, even though price trends first and foremost depend on the development in domestic costs. Imports thus account for around 40 per cent of final domestic demand. For this reason alone, trends in exchange rates and prices abroad are of great significance to the course of prices in Denmark. Furthermore, changes in import prices may impact on Danish wages and profit margins.

In the longer term, a change in foreign prices and the exchange rate will normally have a full impact on domestic prices. Similarly, a sustained higher inflation rate in Denmark than in other countries will at some

¹ Unlike the overall objective, the intermediate target is not stipulated in the Danmarks Nationalbank Act. When the Act was proposed again in 1936, Kjærboel, Minister for Trade, Industry and Shipping, said as follows: "The way in which and the means by which the bank will best be able to ensure the currency system and facilitate the circulation of money and the extension of credit will depend on the circumstances at various times. At this point, it would neither be possible nor appropriate to determine and lay down this in the Act". (Rigsdagstidende, Deliberations of the Folketing (Parliament), 1935-36, col. 2556.)

² In economic theory, purchasing-power parity is often assumed to apply in the long term. Purchasing-power parity means that the price for a domestically manufactured product must correspond to the price in Danish kroner for the same product manufactured abroad. If the purchasing-power parity is a good approximation, an intermediate target of a fixed krone rate entails that domestic inflation will automatically approach inflation in the targeted countries.

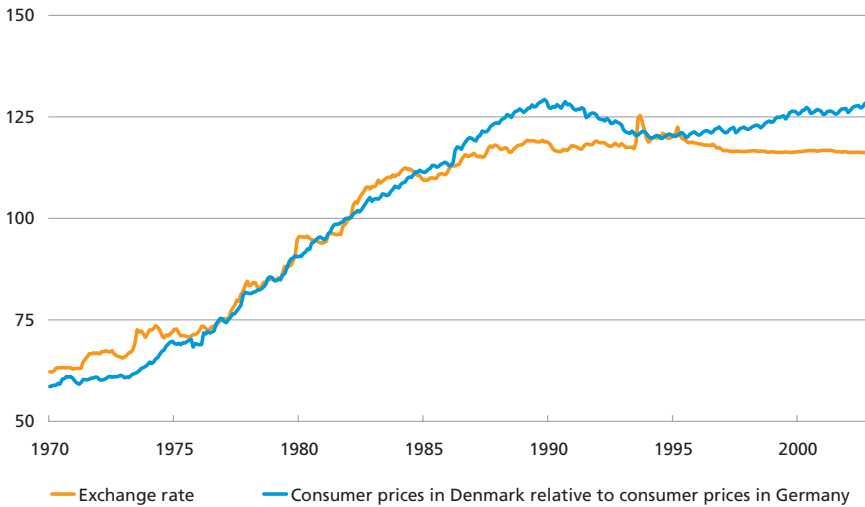
In general, product differentiation, transaction costs (including transport costs), various product standards in various countries, and varying trends in productivity and prices for goods and services not traded across national borders (e.g. rent) can mean that purchasing-power parity does not apply fully, even in the long term, or at least that it does not have a full impact on the available price indices.

Sarno and Taylor (2002) give an overview of a number of empirical studies of purchasing-power parity.

BILATERAL EXCHANGE RATE AND RELATIVE PRICES BETWEEN DENMARK AND GERMANY

Chart 4.1

Index January 1982 = 100



Note: As from January 1999 a synthetic krone rate against the D-mark is used, calculated on the basis of the krone rate against the euro and the official conversion rate between the D-mark and the euro.

Source: The OECD, Statistics Denmark and Danmarks Nationalbank.

point affect the krone rate vis-à-vis other currencies. A cornerstone of the fixed-exchange-rate policy is therefore to ensure that inflation differentials between Denmark and the euro area are limited and temporary.

The krone's domestic and international purchasing power thus cannot be regarded individually. This also means that a devaluation normally has no permanent effects, and in the long term will entail higher prices in Denmark. This undermines the initial improvement in competitiveness after a devaluation, unless there were obvious imbalances from the outset.

Keeping the krone stable vis-à-vis the euro ensures a close relation between inflation in the euro area and inflation in Denmark.

The objective of price stability can therefore be fulfilled by pegging the krone to the currency of one or more countries that pursue a low-inflation economic policy. This is the essence of the foreign-exchange-policy strategy since 1982. With a fixed-exchange-rate policy aimed at the euro, fiscal policy must be planned to keep inflation in Denmark on average in line with inflation in the euro area member states.

Box 4.2 outlines the history of Denmark's foreign-exchange policy.¹

While Danmarks Nationalbank is responsible for monetary policy, as described above, the foreign-exchange policy is determined by the government after consultation with Danmarks Nationalbank. Section 2(3) of the Danish Foreign-Exchange Act thus stipulates that "the guidelines for the foreign-exchange policy to be pursued in the period that the Act is in force shall be determined on the basis of negotiation between Danmarks Nationalbank and the Royal Bank Commissioner".² In most other countries too, the foreign-exchange policy is the responsibility of the government, while monetary policy is the responsibility of the central bank. The government and Danmarks Nationalbank are in contact on an ongoing basis in this respect.

The current framework for Denmark's foreign-exchange policy is the agreement on participation in ERM II, the European Exchange-Rate Mechanism, concluded by the government and Danmarks Nationalbank with the euro area member states and the ECB. The day-to-day conduct of the foreign-exchange policy, including intervention in the foreign-exchange market, is the responsibility of Danmarks Nationalbank. ERM II, Danmarks Nationalbank's implementation of the foreign-exchange policy, and the relation between the monetary policy and the foreign-exchange policy are described in further detail in Chapter 1.

Denmark pursues a fixed-exchange-rate policy. Danmarks Nationalbank keeps the krone stable vis-à-vis the euro.

The experience of Denmark and a number of other countries that pursue a fixed-exchange-rate policy is that – under normal circumstances – it is possible to manage the exchange rate via the interest rate (and intervention in the foreign-exchange market) if there is general confidence in the economic policy.³ It is relatively simple to apply stabilisation of the exchange rate as a fixed rule. In periods of pronounced unrest and great

¹ See Christensen and Topp (1997) for a more detailed description of the transition to a fixed-exchange-rate policy in 1982 and Denmark's monetary policy and foreign-exchange policy since then.
² Consolidated Act on Foreign Exchange, etc. (Consolidated Act, No. 279 of 11 April 1988). The Minister for Economic and Business Affairs is the Royal Bank Commissioner.

³ Theoretically, a central bank can normally stabilise the exchange rate at a given level via its interest-rate and intervention policy. In practice, however, there will always be a limit to how far a central bank can and will go to defend a given exchange rate, since the required means may be incompatible with the economic-policy objectives concerning growth and employment. For example, an extremely high interest-rate increase (by e.g. 100 or 500 per cent) may be so detrimental to the domestic economy that the increase is not credible. Normally, a fixed-exchange-rate policy therefore requires a generally stability-oriented policy to be conducted so as to prevent monetary policy from becoming too stretched. Even though the economic fundamentals are in place, speculative attacks may not be ruled out if doubt arises e.g. concerning the authorities' objectives or willingness to raise interest rates to the necessary extent.

For a critical discussion of fixed-exchange-rate policy, see e.g. Obstfeld and Rogoff (1995).

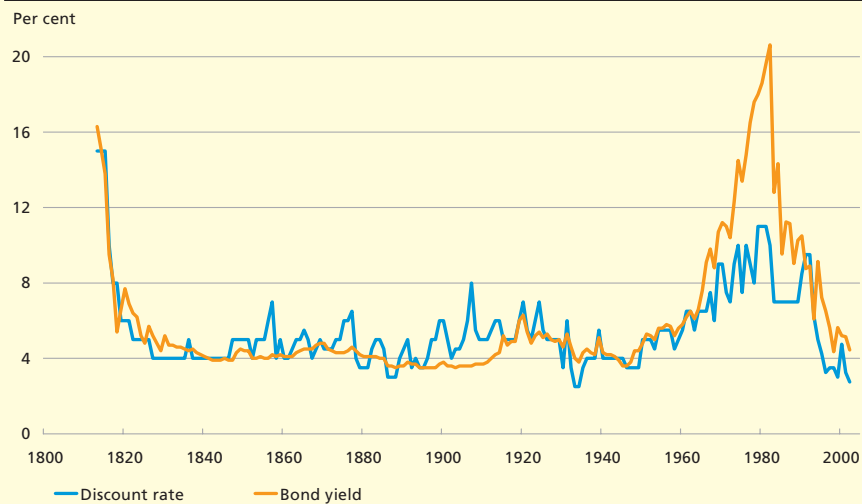
DENMARK'S FOREIGN-EXCHANGE POLICY

Box 4.2

Denmark's choice of an exchange-rate target in monetary policy is deeply rooted. Before 1931 the gold parity was the natural anchor for monetary policy, since the value of banknotes in gold was to be preserved. The abolition of the gold parity created a need for a new nominal anchor. At first the krone was pegged to the pound sterling. Later, Denmark participated in the Bretton Woods System established under the auspices of the International Monetary Fund (IMF) in the post-war years as a system with fixed, but adjustable, exchange rates. The system collapsed at the beginning of the 1970s, and in 1972 the krone participated in the European "currency snake". As from 1979 the snake system continued in the Exchange-Rate Mechanism (ERM) of the European Monetary System (EMS).

The 1970s saw persistent unemployment and high inflation. As a result of high inflation long-term interest rates reached approximately 20 per cent around 1980. This was considerably above the level after the "state bankruptcy" in 1813, cf. Chart 4.2. At the same time, the differential between the short-term and long-term interest rates widened, perhaps because the market expected inflation to rise. The high level of interest rates was one factor making it impossible to ensure full employment.

SHORT-TERM AND LONG-TERM INTEREST RATES IN DENMARK SINCE 1813 Chart 4.2



Note: Interest rates at year-end are used to the greatest possible extent.

Source: Statistics Denmark (1969), Credit-Market Statistics (in Danish), Statistical Reports no. 24; Hans Chr. Johansen (1985), Danish Economic Statistics 1814-1980. Volume 9 of The History of Denmark (in Danish), ed. H.P. Clausen, Svend Ellehøj and Søren Mørch, Copenhagen: Gyldendal; and Danmarks Nationalbank.

The development in Denmark after World War II was by no means unique, although inflation was generally higher than in e.g. Germany. The inflation differential peaked in the mid-1970s, and until the beginning of the 1980s annual inflation in Denmark was just over 10 per cent, cf. Chart 4.3.

Around 1980 most industrialised countries began to implement stability-oriented policies. In Denmark, the change involved tightening fiscal and income policy in several respects. In autumn 1982 the incoming government announced that it would not adjust the exchange rate to serve economic-policy purposes.¹

CONTINUED

Box 4.2

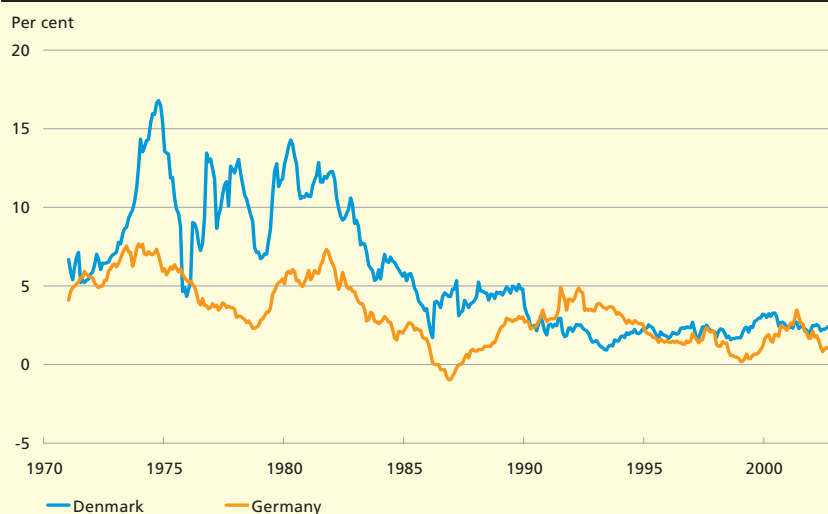
During the 1980s the fixed-exchange-rate policy evolved into a policy whereby the krone rate was held stable vis-à-vis the core currencies of the ERM, in which the D-mark in reality was the anchor.² The third stage of Economic and Monetary Union commenced on 1 January 1999. At the beginning of 2003 the euro was the single currency in 12 member states: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. Prior to the introduction of the euro these member states participated in the ERM together with Denmark. The participating member states were selected on the basis of an assessment of their compliance with the Maastricht criteria on stable and sustainable development in inflation, government debt and deficit, exchange rate and bond yield. Denmark complied with the criteria, but did not wish to participate. Formally, Denmark made use of a protocol in the EU Treaty granting Denmark a derogation right despite compliance with the criteria. This decision was already announced in the Edinburgh agreement in December 1992 and confirmed by a referendum on 28 September 2000.

On the commencement of the third stage of EMU on 1 January 1999 the ERM was replaced by the ERM II as the new exchange-rate mechanism for the euro area and the member states not participating in the third stage of EMU. As described in Chapter 1, Denmark participates in ERM II subject to a narrow fluctuation band of +/- 2.25 per cent around the central rate of kr. 746.038 per 100 euro.

Today Denmark's Nationalbank contributes to the objective of price stability by aiming monetary policy at keeping the krone stable vis-à-vis the euro. The fixed-exchange-rate policy has contributed to stable price development and confidence among households and business enterprises in a stable foundation for economic decisions, without sudden fluctuations.

ANNUAL GROWTH IN CONSUMER PRICES IN DENMARK AND GERMANY

Chart 4.3



Source: OECD and Statistics Denmark.

¹ See the more detailed discussion in e.g. Mikkelsen (1993) and Hoffmeyer (1993). The stabilisation at the beginning of the 1980s is described in further detail in Section 4.4.2 on the interaction between monetary and fiscal policy.

² The central rate of the krone vis-à-vis the D-mark in the ERM was most recently adjusted in 1987.

uncertainty concerning the krone rate significant interest-rate increases have contributed to cushioning exchange-rate fluctuations, but have rarely prevented fluctuations completely.

The exchange rate as an intermediate target is a firm, unequivocal and simple monetary-policy rule. Compared to e.g. monetary aggregates, the exchange rate can furthermore be observed on an ongoing basis, while the money supply is typically only compiled monthly, and is always subject to a certain lag.

Stable price development is beneficial to economic activity. Likewise a monetary-policy strategy directed at fixed exchange rates has the advantage of reducing exchange-rate fluctuations vis-à-vis the currencies in question. This stimulates external trade and investments, since it reduces exchange-rate uncertainty. Besides being an intermediate target, an exchange-rate target can thus also be of value in itself.

Denmark's monetary and foreign-exchange policies ensure that the exchange-rate fluctuations vis-à-vis the euro are very moderate. The euro area is Denmark's largest trading partner, so that the fixed-exchange-rate policy contributes to minimising the exchange-rate uncertainty related to external trade.

Like Denmark, a number of other European countries have pursued a fixed-exchange-rate policy for a prolonged period. The successful fixed-exchange-rate policies contributed to the decision laid down in the Maastricht Treaty of 1992 to introduce a single currency in Europe. So far (until the beginning of June 2003), 12 euro area member states have replaced their former currencies with the euro. Introduction of the single currency is the ultimate fixed-exchange-rate policy, since it irrevocably fixes the reciprocal values of the legacy currencies.

4.2.2 INTERMEDIATE TARGETS OF OTHER COUNTRIES

Direct inflation targets have gained significant ground in recent years. The UK and Sweden, for example, chose intermediate inflation targets shortly after the UK left the ERM and Sweden abandoned its unilateral peg to the ECU during the foreign-exchange crisis in 1992.¹

The exact target varies from country to country. For example, the Bank of England applies an inflation target of 2.5 per cent, while Sveriges Riksbank's inflation target is 2 per cent +/- 1 per cent. It is sought to achieve the inflation target via ongoing adjustment of the monetary-policy instruments. Excessively high inflation is sought dampened by tightening monetary policy, and excessively low inflation is sought coun-

¹ The European currency unit, ECU, was a basket of the member states' currencies. When the euro was introduced as the single currency, it replaced the ECU on a 1:1 basis.

tered by easing monetary policy. In acknowledgement of the lag associated with the impact of monetary policy on price development these countries have usually chosen a medium-term inflation target, e.g. 2 years.

Monetary policy is thus aimed at ensuring a certain level of future inflation. Current inflation, on the other hand, is in principle without special significance in this regime.¹ Deviations between the target and actual inflation will thus occur due to uncertainty concerning the transmission mechanism as well as sudden changes in the economic situation that were not foreseen by the central bank (e.g. changes in oil prices or exchange rates).

Since monetary policy is aimed at future inflation, it cannot also be used to manage the exchange rate. This may cause problems in open economies that are strongly dependent on external trade. It is well-known that floating exchange rates show considerable volatility, and that persistent deviations from equilibrium values may occur.

Monetary policy based on inflation targeting makes great demands of external communication. The reason is that the central bank cannot manage the inflation currently observed, but seeks to manage future inflation, which by its nature cannot be observed. The task faced by the central bank is to explain any deviations between current inflation and the inflation target, and furthermore to explain the monetary-policy decisions, which may sometimes appear to be in conflict with the prevailing economic situation. For example, it requires good communication strategies to explain why a tightening may be called for, even though inflation is close to the target. The communication challenge may increase if there are no signs of inflationary pressure after the tightening, even though this may indeed reflect that the tightening was successful.

Central banks pursuing this strategy therefore devote considerable resources to presenting information about the regime and the monetary-policy decisions. An important element in this communication process is the inflation reports issued at regular intervals (usually quarterly).

In economic theory a distinction is drawn between strict and flexible inflation targeting, cf. e.g. Svensson (1997). While monetary policy under a strict inflation-targeting regime does not consider the development in output and unemployment when determining the monetary-policy stance, the cyclical situation is included in the assessment basis under a flexible inflation-targeting regime. In practice, all central banks with inflation targeting adhere to a flexible regime. The central banks

¹ Current inflation is naturally an important element in the evaluation of the preceding years' monetary policy.

therefore do not seek to eliminate deviations from the inflation target as quickly as possible, but instead to plan monetary policy so as to bring inflation back to compliance with the inflation target within a certain period. The duration of the adjustment period depends on the central bank's weighting of stabilisation of the development in output compared to the development in inflation, and on the current reason for the deviation, cf. Svensson (1999).

Many countries, e.g. the UK and Sweden, apply an inflation target as an intermediate target in monetary policy.

Many countries have applied the money supply as an intermediate target for monetary policy. At the end of the 1970s, targets for monetary aggregates were used to combat rising inflation, cf. Bernanke and Mishkin (1992). It subsequently emerged that the money supply was not of sufficient quality as an intermediate target in many of the countries. Targets for monetary aggregates are thus now rarely used as the basis for monetary policy.

Germany is an often-cited example of a sustained money targeting strategy. From 1975 until the commencement of the third stage of EMU, the Bundesbank officially applied a monetary-aggregate target.¹ However, the implementation of the money targeting was flexible, since deviations from the target were not always countered by means of monetary-policy intervention, cf. Bernanke and Mishkin (1997).² Until recently, Switzerland too applied a target for a monetary aggregate as an intermediate target in monetary policy. After the decline in this indicator's quality as an intermediate target in the late 1990s Schweizerische Nationalbank at the beginning of 2000 decided to base its monetary-policy decisions on a medium-term inflation forecast.

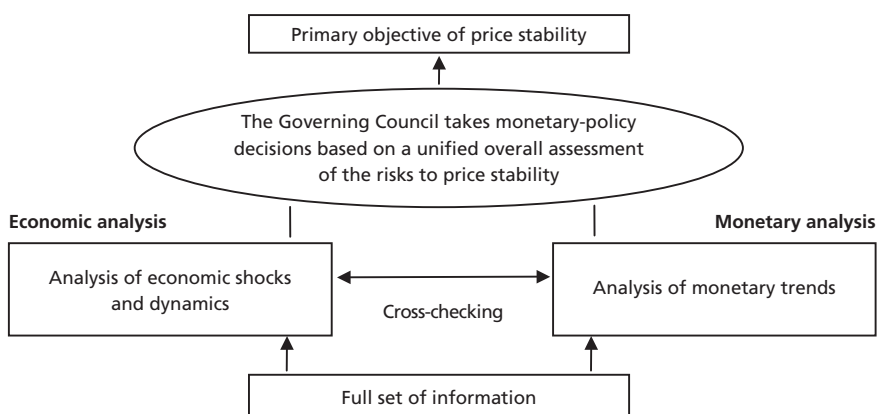
The European Central Bank arranges its monetary policy to meet the Treaty-bound objective of maintaining price stability in the euro area.³ In this connection, the ECB has defined price stability as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2 per cent. Price stability is to be maintained over the medium term. The ECB's Governing Council has announced that in pursuit of price stability it aims to maintain inflation close to 2 per cent, cf. ECB (2003).

¹ See von Hagen (1999) for a review of the circumstances in connection with the application of a monetary aggregate target.

² Bernanke and Mishkin furthermore argue that, in practice, Germany's monetary policy was not far from inflation targeting.

³ The ECB's monetary policy is described in ECB (2003) and previously in ECB (2001) and Issing et al. (2001).

The monetary-policy decisions of the Governing Council are based on a comprehensive analysis of the risks to price stability comprising an economic analysis and a monetary analysis, cf. the illustration below.



Source: Background material for the ECB's press conference on the evaluation of the ECB's monetary-policy strategy on 8 May.

The purpose of the economic analysis is to determine the factors that present a risk to price stability in the short and medium term. The analysis comprises a wide range of economic and financial variables to assess the shocks that impact the euro area's economy and the future macro-economic development.

The purpose of the monetary analysis is to assess the inflationary trends in the medium to long term. The analysis takes into account a large number of monetary indicators, including the money supply, its components and counterparts.¹ The monetary analysis serves primarily to crosscheck the results of the economic analysis.

Monetary policy is medium-term oriented, reflecting that it takes time for monetary-policy measures to be transmitted to price developments. The two sets of analyses both contribute information on the medium term, but from different starting points. The economic analysis focuses on the outlook for price stability in the short to medium term, while the monetary analysis concentrates on the outlook for price stability in the medium to long term.

The ECB's monetary-policy strategy corresponds to actual inflation targeting in several respects. The Governing Council's decision to aim at an inflation rate below and close to 2 per cent in the medium term combined with the inflation analysis in the short and medium term are reminiscent of inflation targeting. However, the inflation forecast is not

¹ Furthermore, the development in the money supply is compared to a reference value for annual growth in M3.

the pivotal point of the ECB's strategy, unlike the practice of the inflation-targeting central banks. The ECB's structuring of the analysis behind the monetary-policy decisions is thus different from the structure applied by central banks with an inflation target as the intermediate target. Overall, the ECB's monetary policy can be viewed as a strategy that combines several elements to fulfil the main objective of price stability, rather than focusing on one intermediate target.

The monetary policy of the European Central Bank builds on a quantitative definition of price stability and an overall evaluation of risks to price stability based on an economic and a monetary analysis.

In the USA, the Federal Reserve does not apply intermediate targets in its conduct of monetary policy. Some observers have therefore characterised the US monetary policy as a "just-do-it" policy, cf. Lyngesen (1999). Monetary policy is adjusted on an ongoing basis against the background of the overall objectives, i.e. maximum employment, stable prices and moderate long-term interest rates. In the absence of an explicit intermediate target, the Federal Reserve has sometimes responded to the development in other macroeconomic indicators besides prices. Cases in point are the easing of monetary policy after stock prices plummeted in October 1987, and the relaxations in 1998 after the unrest on the international financial markets.

In recent years the Federal Reserve has applied "pre-emptive strikes" in pursuit of the overall objectives. The rationale behind these measures is that it is easier for the central bank to fulfil the objectives when it responds to a changed outlook for e.g. future inflation, rather than waiting until the increase/decrease in inflation turns up in the actual figures. This procedure is similar to the monetary-policy strategy under an inflation-targeting regime where the central bank will also respond to a changed outlook for inflation.

The Federal Reserve does not apply intermediate targets in its conduct of monetary policy.

4.3 INSTRUMENTS

The monetary-policy instruments are the first link in the chain from monetary-policy measures via intermediate targets to the final objective of monetary policy. The instruments are variables controlled directly by

the central bank such as a short-term interest rate or base money¹. The central monetary-policy decisions relate to the ongoing setting of values for the monetary-policy instruments.

The majority of central banks currently apply a short-term interest rate as their monetary-policy instrument. This is often a rate of interest for one of the facilities made available by the central bank to the banks, but it may also be an (in principle) market-determined interest rate that the central bank seeks to manage via (money-) market operations. In the latter case, the interest rate to be managed is often referred to as an "operational target".²

Most central banks apply a short-term interest rate as their monetary-policy instrument.

The choice of monetary-policy instruments should be viewed in the light of their function as generator of the monetary-policy transmission mechanism. With an intermediate target that contributes to meeting the overall objective the monetary-policy instruments should be arranged to meet the intermediate target. An optimum instrument shows close and stable correlation with the intermediate target, so that changes in the instrument have direct and predictable consequences for the intermediate target.

Poole (1970) put forward the classical theoretical analysis of the optimum choice of monetary-policy instrument.³ Poole sets out a simple IS-LM model for whether a central bank seeking to stabilise the development in output should choose an interest rate or a monetary aggregate as its instrument.⁴ The main result is that if shocks in the financial markets (e.g. to the demand for money or to the relation between the money base and broader monetary aggregates) prevail, the interest rate is the optimum instrument. If, on the other hand, shocks to overall demand (e.g. to consumption or investment) prevail, a monetary aggregate is the appropriate instrument. If money demand is often affected by shocks, an interest-rate instrument has the advantage of allowing corresponding variation in the money supply. This prevents the shocks from spilling over to interest rates, so that consumption, investment and output remain unaffected. Conversely, the best way to stabilise output

¹ The money base is defined in Box 4.3.

² If the central bank can control the operational target to a high degree, the distinction between an operational target and an instrument is less important.

³ Friedman (1990) gives an overview of the research in monetary-policy instruments and targets.

⁴ The qualitative results presented below are also found in more complete models, cf. Friedman (1990).

MONETARY AGGREGATES¹

Box 4.3

Money is often defined (theoretically) according to its functions as a means of payment, a store of value and a unit of account. The function as a means of payment is particularly important, as it distinguishes money from other financial assets. If a claim is to be generally accepted as payment, its value must be stable. Furthermore, it is appropriate to use the means of payment as a unit of account so as to avoid conversion on payment.

In a definition of money it is natural to include banknotes and coins, but also deposits in accounts that include a Dankort (direct debit) payment card or a cheque, which are almost as liquid as banknotes and coins. This definition thus includes interest-bearing assets, and it may be difficult to exactly define money and non-money. The next step – to include other types of bank deposits – seems inevitable, as deposits in Dankort or cheque accounts are close substitutes for other deposits. Other assets may also be included, e.g. short-term securities and unused loan commitments granted by banks.

The following concepts are used in the most popular definitions. There are no standards for these concepts, but only general guidelines:

- The money base (M0) is a measure of the liquidity generated by the central bank vis-à-vis households and business enterprises, local government and banks.
- Broader monetary aggregates (M1, M2, M3). M1 is normally the narrowest monetary aggregate, and the other aggregates are numbered according to their coverage. M1 is normally delineated as the non-banking sector's holdings of banknotes and coins and residents' demand deposits with banks. M2 normally comprises M1 plus residents' short-term time deposits. M3 usually encompasses M2 plus residents' long-term time deposits and holdings of short-term debt certificates.

¹ The ECB's monetary aggregates are described in Nielsen and Pedersen (1999). Denmark's Nationalbank applies the ECB's definitions in its compilation of the money supply in Denmark.

in the event of shocks to aggregate demand is to let interest rates carry part of the adjustment.

The original analysis in Poole's article makes no distinction between base money and broader monetary aggregates (see the definitions of various monetary aggregates in Box 4.3). However, in practice it is important to distinguish between the two, since the central bank can control base money, but not the course of the broader monetary aggregates. If the analysis takes this factor into account, it turns out that this increases the relative advantage of using the interest rate as the monetary-policy instrument, cf. e.g. Walsh (1998).

In practice most central banks now apply an interest rate as their monetary-policy instrument. One reason is that it has proved increasingly difficult in many countries to identify a stable relation between money demand and its determinants, partly due to the constant evolution of the financial markets. Another reason is that the central bank, as stated, cannot control the broader monetary aggregates, but only the narrower money base.

4.3.1 MARKET ORIENTATION OF MONETARY POLICY

The overall framework for monetary policy has changed in several respects over the last decades. This has also impacted on the monetary-policy instruments used by central banks. Supervision of the banks' extension of credit and interest rates as well as other administrative measures was previously a frequently applied monetary-policy instrument. On the surface at least it played an important role in the management of economic development via economic policy.

Today the various quantitative regulations of the financial sector have been more or less abolished, and price formation is subject to market terms. Monetary policy is also implemented on market terms, and credit extension is influenced indirectly via the market's response to adjustments of the official interest rates. In other words, the widespread use of the market mechanism has entailed that monetary policy is conducted via interest rates, and not by direct rationing of credit extension by banks, etc.

The market orientation has also led to depoliticisation of monetary policy. Decisions to e.g. adjust interest rates or the structure of the monetary-policy instruments are now of a more technical and less political nature than previous lending restrictions, etc. This has furthermore supported the trend for more independent central banks.

Monetary policy is implemented on market terms. Outright regulation is not applied.

The trend for a more market-oriented monetary policy is mirrored by the liberalisation of capital flows to and from abroad. The abolition of (the possibility of) quantitative regulation in monetary policy is moreover in accordance with the tendency for economic policy to provide a framework, while leaving it to the market forces to apply the framework in practice.

4.3.2 DENMARK

Denmark's monetary-policy instruments and their use are described in detail in Chapter 1. Denmark's Nationalbank's instruments are associated with the facilities made available to the monetary-policy counterparties, i.e. lending against collateral, certificates of deposit and current-account deposits. Denmark's monetary-policy interest rates are Denmark's Nationalbank's lending rate (equal to the rate of interest for certificates

of deposit), the current-account rate and the discount rate. Danmarks Nationalbank sets the monetary-policy interest rates in order to keep the krone stable vis-à-vis the euro, i.e. with a view to compliance with the intermediate target for monetary policy. In line with international practice, the primary monetary-policy instruments are short-term interest rates. Since the instruments are rates of interest for the counterparties' deposits with and loans from Danmarks Nationalbank, they are determined by the Board of Governors of Danmarks Nationalbank.

Denmark's most important monetary-policy instruments are the monetary-policy interest rates, i.e. the discount rate, the current-account rate and Danmarks Nationalbank's lending rate. The last-mentioned is equal to the rate of interest for certificates of deposit.

4.3.3 OTHER COUNTRIES

As stated, most central banks apply a short-term interest rate as their monetary-policy instrument. The variations in the different countries' instruments are found at a more detailed level. The specific arrangement of a country's monetary-policy instruments is often the result of tradition, and has no vital significance in practice.¹

The Eurosystem also applies a short-term interest rate as its key monetary-policy instrument, cf. Section 1.4. The primary facility is the weekly market operations in which the Eurosystem allots liquidity to the counterparties. Since June 2000 this allotment of liquidity has taken place via variable-rate tenders with a minimum bid rate set by the ECB's Governing Council. The minimum bid rate signals the monetary-policy stance.

The Eurosystem also makes available a deposit facility and a marginal lending facility to its counterparties on an overnight basis. The counterparties may use these standing facilities at their own initiative, so that the deposit rate and the marginal lending rate constitute a corridor for the overnight interest rate in the euro money market. In order to further limit the fluctuations in the overnight interest rate the Eurosystem applies a minimum reserve system. Under this system the credit institutions in the euro area must deposit an amount with the Eurosystem equivalent to a certain proportion of their liabilities.

¹ Blenck et al. (2001) presents a review of the instruments, operational targets and procedures applied by the central banks of Japan, the USA and the euro area.

The operational target takes a more central position in the USA's monetary policy than the instruments that are used to achieve it. The Federal Reserve sets a federal funds target rate for the rate of interest for overnight liquidity in the interbank market, and seeks to achieve the target by entering into repurchase agreements in government securities with selected counterparties. The operational target for the federal funds rate is the interest rate signalling US monetary policy. In the USA too, monetary policy is thus centred around a short-term interest rate.

The Federal Reserve requires all credit institutions receiving deposits to hold reserves at the central bank. It also offers a standing lending facility to generally sound counterparties. This facility gives the counterparties access to very short-term (often overnight) loans at a discount rate that exceeds the federal funds target rate.

The Bank of Japan normally has an operational target for the overnight interest rate for liquidity (the call rate), and seeks to achieve this target by buying and selling securities in the market.¹ The Bank of Japan also applies a minimum reserve system requiring all credit institutions receiving deposits to hold reserves at the central bank corresponding to a certain proportion of the deposits. Finally, the Bank of Japan offers a facility whereby the counterparties can obtain very short-term loans from the central bank at a discount rate exceeding the target for the call rate.

4.4 FROM STRATEGY TO PRACTICE

The preceding sections have reviewed the key elements of a monetary-policy strategy. A clear monetary-policy strategy specifying objectives, intermediate targets and instruments is a precondition for an effective monetary policy. However, a successful monetary policy also depends on many other factors. Some of these factors are discussed in the following from a predominantly Danish perspective.

4.4.1 INDEPENDENCE

During the 1980s and 1990s most countries sharpened the focus on making their central banks independent of the political system. The background was especially the practical experience from the coordination policy of the 1960s and 1970s, although a number of theoretical concerns also played a role. Both practitioners and theorists thus agree that a

¹ In March 2001 the Bank of Japan decided to set an operational target for the financial institutions' current-account deposits with the central bank until consumer prices cease to decline. Japan's monetary policy in recent years is reviewed in further detail in Beier (2002).

central bank that is not under direct political control provides the best platform for price stability, cf. e.g. Cukierman (1998).

Central-bank independence is a vital element of the EU Treaty's provisions concerning the ECB, i.e. the central bank of the euro area member states, and the national central banks.¹ Independence of the political system is stressed *inter alia* by the rule that the members of the decision-making bodies of the European System of Central Banks may not seek or take instructions from national governments in the performance of their tasks. The Treaty also stipulates a number of criteria for the appointment of members of the ECB's Executive Board. They are appointed by the heads of state and of government, with focus on their professional expertise.

Like most other central banks, Danmarks Nationalbank is independent. This independence is laid down by law and complies with the EU Treaty's provisions concerning the independence of central banks.

The current Danmarks Nationalbank Act is from 1936. The Act and the associated by-laws comply with the EU Treaty's requirements concerning the independence of central banks.² The Board of Governors undertakes the day-to-day management of Danmarks Nationalbank and determines and adjusts monetary policy on an ongoing basis. Danmarks Nationalbank may thus tighten or relax monetary policy at its discretion, but must inform the government prior to any adjustment of the discount rate. Nevertheless, the decision rests with the Board of Governors of Danmarks Nationalbank, irrespective of the government's position.

The background to Danmarks Nationalbank's independence is primarily historical. Denmark's very considerable military expenditure on several wars in earlier centuries was financed by issuing banknotes. As a result, the value of the banknotes was almost completely eroded. Using current terminology, the central government resorted to monetary financing of its deficits. Against this background Danmarks Nationalbank was already granted independence on its establishment in 1818. It would otherwise have been difficult to gain the population's confidence in the bank's ability to maintain the purchasing power of the currency. Today the EU Treaty contains a prohibition on monetary financing of government deficits, cf. Section 1.5.2.

¹ The UK is exempt from the provisions concerning the independence of central banks for as long as this member state remains outside the euro area.

² The European Monetary Institute, EMI, the predecessor of the ECB, and the European Commission found in their convergence reports of March 1998 that the Danish central-bank legislation is compatible with the independence requirement laid down in the EU Treaty.

An independent central bank must have the financial strength to take monetary-policy decisions without consideration of the impact on its financial position. One reason is that the central bank's independence of the political system may be compromised if the central bank's net capital is insufficient, making a capital contribution from the central government necessary.

It is also important for the central bank's independence that no groups in society are given special borrowing privileges. This ensures that monetary policy – including monetary-policy interest rates – is not undermined by borrowing privileges regarded as prudent at a given time.

Finally, certain differences between monetary policy and other economic policy call for delegation of responsibility for monetary policy to an independent central bank. Firstly, the monetary-policy instruments applied today do not have the same distributional consequences as before, cf. Section 4.3.1. Secondly, it is especially important to ensuring monetary stability that a long-term perspective is applied to monetary-policy planning. As stated, expectations of and confidence in the future monetary policy are prerequisite to the intermediate target of monetary policy functioning as the nominal anchor of the economy.

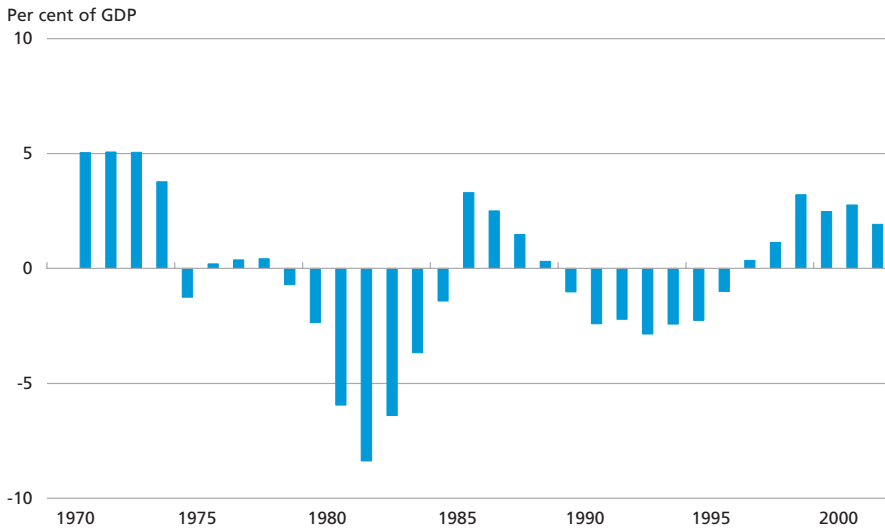
4.4.2 INTERACTION WITH FISCAL POLICY

The central bank's ability to meet the intermediate targets of monetary policy and fulfil the overall objectives depends on the compliance of fiscal policy with certain requirements. Fiscal policy must be sustainable irrespective of the objectives and intermediate targets that are pursued. An unsustainable fiscal policy might dominate monetary policy and become the decisive factor for the development in prices. Ultimately, imbalance between public revenue and expenditure may oblige the central bank to abandon the objective of price stability. An independent central bank and a clear monetary-policy strategy, among other factors, can help ensure that this is avoided.

The interaction between monetary and fiscal policy is of great significance to the effectiveness of the overall economic policy. In practice, the division of work may be more or less explicitly stated. In Denmark's case it is explicitly stated: monetary policy is aimed at keeping the krone stable vis-à-vis the euro, whereas any specific Danish requirement to stabilise the cyclical development is to be accommodated via fiscal policy. In Denmark's experience one must be careful to avoid the stabilisation policy creating its own fluctuations. Furthermore, the norm for central-government borrowing plays an important role in the separation of monetary and fiscal policy, cf. Section 1.5.2.

GOVERNMENT BUDGET BALANCE IN DENMARK

Chart 4.4



Source: Statistics Denmark.

The division of work relating to Denmark's economic policy was established after the stabilisation in 1982. The late 1970s and early 1980s saw clearly unsatisfactory economic development. In 1982 unemployment had risen to around 10 per cent of the labour force, annual inflation exceeded 10 per cent, and the long-term interest-rate differential between Denmark and Germany was above 10 per cent. At the same time, the government budget deficit was increasing rapidly, and exceeded 8 per cent of GDP in 1982, cf. Chart 4.4.

The stabilisation after the change of government in 1982 comprised a declaration that devaluation would not be an element of economic-policy planning. It subsequently also comprised a tightening of fiscal policy and the abolition of the cost-of-living adjustment. The promise to pursue a fixed-exchange-rate policy was soon put to the test when Sweden – Denmark's second-largest trading partner – devalued its currency by 16 per cent one month later. Denmark did not devalue. This and the other tightening measures meant that the credibility of Denmark's economic policy was soon enhanced. In the following years the government budget improved, cf. Chart 4.4, and the inflation and interest-rate differentials to Germany fell significantly.

In the euro area the responsibilities are also clearly distributed between the single monetary policy and the fiscal policies of the individual member states. The primary objective of monetary policy is to maintain price stability in the overall euro area, but it is up to the fiscal policy of

the individual member state to remedy a member state's deviation from the development in the rest of the euro area, within the framework of the Stability and Growth Pact.

A clear and widely accepted division of work between monetary and fiscal policy enhances the effectiveness of economic policy.

4.4.3 OPENNESS AND TRANSPARENCY

There is now a clear trend for central banks, like other areas of society, to provide more information on their tasks, objectives and decisions. The increase in external communication is via e.g. websites, press conferences, hearings, speeches and reports. The increased information level reflects greater openness regarding monetary policy.¹

For a central bank the ideal external communication scenario is where the general public and financial-market players have a genuine understanding of monetary policy. Achieving this understanding naturally makes demands of both the central bank and the outside world. By enhancing the transparency of monetary policy the central bank can make it easier for the outside world to understand monetary policy.

However, the means to achieve greater transparency is not necessarily to increase the amount of information from the central bank, since good communication is a complex task. Nevertheless, by publishing consistent and relevant information, the central bank can contribute to the general public's understanding of the monetary-policy decisions.

The significance of the exchange-rate regime is often overlooked in discussions of the transparency of monetary policy.² This is unfortunate, since both the requirements of and the opportunities for ensuring transparency depend on whether the central bank manages the exchange rate or not.

Monetary policy is fundamentally more transparent in a fixed-rate regime than in a floating-rate regime, because the general public can observe at all times whether the central bank pursues the promised policy, and since it is technically less complicated for the central bank to manage an exchange-rate target than a future inflation target. Under a fixed-exchange-rate regime the information requirement is therefore lower. In particular, there are fewer factors of relevance to monetary policy. In order to achieve the same degree of transparency, a central bank applying

¹ See Winkler (2000) for an analysis of openness and transparency in monetary policy.

² The relation between exchange-rate regimes and transparency is discussed in Storgaard (2002).

inflation targeting in its monetary policy therefore has to issue more information than a central bank pursuing a fixed-exchange-rate policy.

A central bank applying inflation targeting must conduct a comprehensive analysis of the outlook for inflation as the basis for the monetary-policy decisions. Under a fixed-exchange-rate regime the monetary-policy decisions will usually be based on other analyses that focus especially on the course of the exchange rate as well as supply and demand in the foreign-exchange market in the short and long term. The differing internal analyses that are the basis for monetary-policy decisions will naturally be reflected in the information issued under the two different types of monetary-policy regime.

Openness and transparency in monetary policy contribute to enhancing the external understanding of the monetary-policy decisions. The central bank's external communication should reflect the monetary-policy strategy.

Openness and transparency also play a role with regard to the outside world's opportunities of holding the central bank accountable for its conduct of monetary policy. As stated above, many countries have delegated the responsibility for monetary policy to an independent central bank mandated to determine monetary policy in compliance with a politically determined objective. Since the central bank's decisions are made independently of the political system, there is a need to be able to assess whether the central bank's actions are in accordance with the given objective.¹ The central bank can facilitate the outside world's opportunities to make this assessment by conducting an open and transparent monetary policy that explains the strategy and the decisions implemented.

Most central-bank acts contain provisions concerning the central bank's accountability for its decisions. Danmarks Nationalbank is statutorily obliged to publish an annual report on its activities in the past year.² Moreover, during the year Danmarks Nationalbank reports on the monetary and foreign-exchange policy in the Monetary Review, as well as in speeches and interviews, etc., cf. the overview in Appendix 1.B.

According to the EU Treaty, the European Central Bank shall publish quarterly reports and an annual report.³ In practice, the ECB has opted to publish a Monthly Bulletin containing the ECB's assessment of the

¹ See e.g. Blinder (1998).

² Section 17 of the Danmarks Nationalbank Act.

³ The Statute for the European System of Central Banks and the European Central Bank, Article 15.

economic situation, as well as the background for the monetary-policy decisions. After the first meeting of the Governing Council each month a press conference is held with the participation of the President and Vice-President of the ECB. At the press conference the monetary-policy decision is presented, as well as the Governing Council's views on the economic situation and the outlook for price stability. Furthermore, each quarter the President of the ECB reports on monetary policy to the Committee on Economic and Monetary Affairs of the European Parliament.¹

In the USA, the Chairman of the Board of Governors of the Federal Reserve is legally obliged to participate in semi-annual monetary-policy hearings in Congress.² In this connection the Federal Reserve Board must present a report to Congress on the conduct of monetary policy, economic developments and prospects for the future.³

4.4.4 CREDIBILITY

In the 1970s many countries experienced stagflation, i.e. inflation rose, while the economy stagnated. One of several explanations of high inflation found in the economic literature is that there is a fundamental credibility problem associated with monetary policy.⁴ The train of thought can be outlined as follows: a central bank seeking to stimulate output has an incentive to conduct an expansionary monetary policy. This is realised by the private sector, which adjusts its inflation expectations upwards to the exact level where the central bank's incentive to stimulate output via an inflationary monetary policy is eliminated. The result is that the central bank does not succeed in stimulating output, but inflation is nonetheless still higher than desired by both the central bank and the private sector. This is called an "inflation bias" in the literature. If the central bank could, in a credible manner, undertake not to surprise the private sector with an expansionary monetary policy, it would be possible to achieve a lower inflation rate without diminishing the output performance.

For a central bank applying an exchange-rate target, the issue of credibility is not associated directly with the inflationary effects of an

¹ See e.g. ECB (2001) for a more complete review of the ECB's communication activities. Eijffinger and Hoerberichts (2002) compare how the central banks in the euro area, Canada, Japan, the UK and the USA are held accountable for their monetary-policy decisions.

² US Code, Title 12, Chapter 3, Section 225b.

³ The development in the reporting requirements of the Federal Reserve is described in Pollard (2003).

⁴ See e.g. Barro and Gordon (1983). Barro and Gordon show that in some cases a central bank obliged to stimulate output, and also stabilise the development in both inflation and output, may benefit from applying a fixed rule for monetary policy to avoid credibility problems. The authors assume that it is possible for the central bank to stimulate output in the short term only. In the long term this is a classical model in the sense that monetary policy has no impact on output.

expansionary monetary policy. Instead, a credibility problem may arise if the outside world lacks confidence in the central bank's willingness to defend the announced fixed exchange rate, or in the compatibility of other economic policy with the fixed-exchange-rate policy. Lack of confidence in a fixed-exchange-rate regime can have serious consequences if the loss of credibility leads to a speculative attack on the currency.¹

The central bank's primary instruments to counter a speculative attack are intervention in the foreign-exchange market and adjustment of the monetary-policy interest rates. If the pressure on the currency is attributable to a lack of confidence in the general economic policy, it may also be necessary to adjust e.g. fiscal policy in order to stabilise the foreign-exchange market.

Credibility is thus a precondition for an effective monetary policy, irrespective of the central bank's monetary-policy strategy. However, it normally takes years for a central bank to gain the confidence of the outside world in its commitment to pursue the announced policy. The most certain way for the central bank to build credibility is to show its ability and commitment to pursue the chosen strategy over a sustained period.

A successful monetary policy requires the central bank to be perceived as credible.

¹ There is an extensive literature on speculative attacks. Drazen (2000) is a recent contribution that takes into account the central bank's ability to adjust the monetary-policy interest rates to defend the currency. Sarno and Taylor (2001) describe the literature on intervention in the foreign-exchange market.

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Glossary

Adjustable-rate loan

In Denmark this term often refers to a mortgage-credit loan for which the rate of interest is adjusted to the current market terms with a pre-specified frequency, e.g. annually.

Arbitrage

The simultaneous purchase and sale of a financial asset to exploit minor price differences in order to obtain a risk-free gain. The simultaneous purchase and sale of one currency against another is called currency arbitrage.

Banking days

Business days of the financial sector (and Danmarks Nationalbank).

Basis point

1 basis point is 0.01 percentage point. Applied especially to interest-rate changes and interest-rate spreads.

BIS (Bank for International Settlements)

BIS is an international organisation whose objective is to promote monetary and financial stability. BIS is also often referred to as "central banker to the central banks".

Central rate

In ERM II a bilateral central rate vis-à-vis the *euro* is fixed for the currency of each participating country. See under *ERM II*.

Certificates of deposit

Zero-coupon papers issued by Danmarks Nationalbank as part of its *monetary policy*. Certificates of deposit may be traded among the *monetary-policy counterparties*, but cannot be negotiated outside their circle. Trading in certificates of deposit is a way of exchanging *liquidity* without credit risk for *settlement* on the same day.

CIBOR (Copenhagen InterBank Offered Rate)

Reference interest rate on the Danish *money market* for a number of financial contracts. CIBOR is the interest rate at which a bank is willing to lend uncollateralised krone *liquidity* to another prime bank on the Danish money market. Danmarks Nationalbank calculates CIBOR on the basis of interest rates reported daily by currently 8 individual banks. CIBOR corresponds to *EURIBOR* on the European money market.

Clearing

Compilation of purchases and sales of financial contracts as the basis for calculation of the parties' gross or net positions.

Examples are cheque clearing, clearing of Dankort transactions and transfers via BetalingsService (direct debit), etc. in connection with netting in the *Sumclearing*. All payments to and from an individual participant are netted as one payment, which is then settled via the participants' accounts at Danmarks Nationalbank. See also *Settlement*.

CLS (Continuous Linked Settlement)

International system for *settlement* of currency trades. CLS is a private banking company established and owned by the world's largest commercial foreign-exchange dealers. In CLS currency trades are settled according to the "payment versus payment" principle whereby both parties to a currency trade must first pay their part of the trade to CLS before the payments are exchanged. In this way neither party incurs a settlement risk from paying its part of the trade without being sure of receiving payment from the counterparty. At the beginning of 2003 currency trades could be settled in US, Australian and Canadian dollars, *euro*, Japanese yen, pounds sterling and Swiss francs. Danish and Norwegian kroner, Swedish kronor and Singapore dollars are expected to join CLS in the 2nd half of 2003.

Commercial Paper (CP)

Zero-coupon paper with maturity of up to one year. The Danish central government has CP programmes in foreign currency that give access to raise foreign loans at short notice, e.g. to strengthen the *Foreign-exchange reserve*.

Conversion

Conversion of loans. Most fixed-rate mortgage-credit loans in Denmark are subject to a conversion right whereby the loans can e.g. be converted to loans at lower interest rates, should this be an advantage when interest rates are falling.

Correspondent bank

A bank which executes payments, etc. for another bank or a mortgage-credit institute.

Settlement of foreign-exchange transactions normally takes place via a bank in the home country of the currency in question. For instance, GBP is settled via a bank in the UK. This need not be a British bank, but can also be a UK branch of a foreign bank. *Foreign-exchange dealers* normally have a network of correspondent banks holding foreign-exchange accounts in different countries. In practice the parties independently send payment instructions to their respective correspondent banks to transfer the sold amount to the counterparty's account with its correspondent bank.

In the *money market* the banks and mortgage-credit institutes with no relations with Danmarks Nationalbank (typically small banks) e.g. use accounts with correspondent banks in their *liquidity* management.

Currency arbitrage

See *Arbitrage*.

Currency swap

See *Foreign-exchange swap*.

Current account

Only *monetary-policy counterparties* may hold current accounts at Danmarks Nationalbank which are remunerated at the *current-account rate*. The current accounts of other account holders are non-interest-bearing.

Current-account limit

Ceiling for the *current-account* deposits of the *monetary-policy counterparties* at Danmarks Nationalbank at the close of the day. This limits the total volume of overnight krone liquidity that the counterparties overall may raise at their own initiative. The total current-account limit is broken down as individual current-account limits for the counterparties. If the total limit is exceeded at the close of the day, deposits exceeding the individual limits will be converted into *certificates of deposit*. The current-account limits are designed to prevent the accumulation of excess *liquidity* that may be used for speculation in future interest-rate or exchange-rate changes.

Current-account rate

The rate of interest on the *current accounts* of the *monetary-policy counterparties* at Danmarks Nationalbank. In the period from April 1992

to date (early June 2003) the current-account rate has been equal to the *discount rate*.

Delivery versus payment

Settlement principle in connection with securities trading whereby money and securities are exchanged simultaneously. See also *Settlement*.

Deposits

Uncollateralised loans that are traded in the Danish *money market* with standardised maturities of between 1 day and 12 months.

Derivatives

Financial instruments of which the market value depends on the market value of other (underlying) assets. See also *Options, Futures* and *Interest-rate derivatives*.

Difference settlement

Settlement of net gains and losses in connection with financial *derivatives*.

Discount rate

Danmarks Nationalbank's discount rate is a signal rate indicating the overall level of the *monetary-policy interest rates*. None of the *monetary-policy instruments* directly accrue interest at the discount rate, but from April 1992 to date (early June 2003) the *current-account rate* has been equal to the discount rate.

DN Inquiry and Transfer System

IT system used by the *monetary-policy counterparties* in connection with pledging of collateral for *monetary-policy loans* from Danmarks Nationalbank.

DN News

Danmarks Nationalbank's system for issuing information to connected news agencies. *Monetary-policy counterparties* can view information from DN News via the *DN Inquiry and Transfer System*.

ECB

Abbreviation for the European Central Bank. The ECB is the common central bank for the *euro area*.

Effective krone rate

The effective krone rate is calculated as a weighted average of the development in the bilateral krone rates vis-à-vis Denmark's most important trading partners. The weights are calculated on the basis of trade in manufactured goods in 1995. An increase in the index reflects a strengthening of the krone vis-à-vis the weighted average of the currencies included in the index.

EONIA (Euro OverNight Index Average)

Rate of interest on *euro*-denominated lending commencing on the day that the contract is entered into, and expiring on the following banking day. This makes EONIA an *overnight interest rate*.

ERM II (Exchange-Rate Mechanism II)

European fixed-exchange-rate system. In ERM II a bilateral central rate vis-à-vis the *euro* is fixed for the currency of each participating country. For each currency the standard fluctuation band for the bilateral exchange rate vis-à-vis the euro is +/- 15 per cent around the central rate. Under the ERM II agreement it is, however, possible to negotiate a narrower band. Denmark participates in ERM II at a central rate of kr. 746.038 per 100 euro. Due to its high degree of economic convergence with the *euro area*, Denmark has been able to enter into an agreement for a narrow fluctuation band of +/- 2.25 per cent. Within ERM II the central rates may be adjusted. Decisions relating to central rates and the standard fluctuation band require agreement among the ministers from the euro-area member states, the *ECB*, and the ministers and central-bank governors of the non-euro-area member states participating in ERM II.

EURIBOR (EuRo InterBank Offered Rate)

The rate of interest at which a bank is willing to lend uncollateralised euro liquidity to another prime bank in the euro-interbank market. EURIBOR is determined for maturities of 1 week to 12 months and is the reference interest rate for a number of financial contracts, e.g. *interest-rate swaps*. Corresponds to *CIBOR* in the Danish money market.

Euro

The single currency of the *euro area*.

Euro area

Aggregate term for the EU member states that have introduced the single currency, the *euro*. The following member states introduced the euro from 1 January 1999: Austria, Belgium, Finland, France, Germany,

Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain. Greece joined the single currency with effect from 1 January 2001.

Euroclear

Settlement and custody institution for securities. See *Settlement*.

Eurosystem

Comprises the European Central Bank (*ECB*) and the national central banks in the *euro area*.

Foreign-exchange brokers

Intermediaries that do not themselves take positions, but solely establish contact between agents supplying and demanding *foreign-exchange-market* products. On an anonymous basis, the brokers continuously state the best bid and offer prices in the individual products for standardised maturities on the basis of rates provided by the individual banks.

Foreign-exchange dealers

Pursuant to the Danish Order on Foreign Exchange foreign-exchange dealers are financial institutions that on a commercial basis act as intermediaries for payments between *residents and non-residents* via accounts with or on behalf of foreign banks.

Foreign-exchange dealers are e.g. banks that purchase and sell foreign exchange for their customers, to hedge their own positions, or in connection with *currency arbitrage*.

Foreign-exchange market

The Danish foreign-exchange market is the market for purchase and sale of foreign exchange against Danish kroner. All transactions involving transfer of a position in Danish kroner against foreign exchange from one participant to another are part of the Danish foreign-exchange market. The market is not geographically delineated. Purchase and sale of foreign exchange against Danish kroner solely between non-residents thus also forms part of the Danish foreign-exchange market. The foreign-exchange market is central to the *monetary and foreign-exchange policy* since the krone rate is formed in this market. Danmarks Nationalbank undertakes *intervention* (purchase and sale of foreign exchange against Danish kroner) in order to stabilise the krone's exchange rate against the *euro*.

Foreign-exchange option

Transaction giving one of the parties the right, but not the obligation, at a fixed time in the future to purchase or sell an amount in one cur-

rency against an amount in another currency at an agreed exchange rate.

Foreign-exchange options are used to e.g. hedge exchange rates. An export company which will receive dollars in six months' time can buy an option giving the right, but not the obligation, to sell dollars at a specific exchange rate in six months' time. The company is thus guaranteed a minimum exchange rate for its revenue denominated in dollars. The company pays a premium for the option that is dependent on several factors, primarily maturity, exchange-rate volatility and the required minimum exchange rate. See also *Options*.

Foreign-exchange reserve

Danmarks Nationalbank's holdings of net foreign assets. The foreign-exchange reserve consists of secure and liquid assets that are mainly deposits with foreign banks and foreign securities that are easy to sell or use as collateral for loans should the need arise. In addition, Danmarks Nationalbank's stock of gold is included in the foreign-exchange reserve. The purpose of the foreign-exchange reserve is primarily to enable Danmarks Nationalbank to intervene in the *foreign-exchange market* rapidly and at its own initiative with a view to stabilising the krone vis-à-vis the *euro* if necessary. See also *Intervention*.

Foreign-exchange spot transaction

Foreign-exchange transaction (purchase or sale of foreign exchange against Danish kroner) for *settlement* no later than two *banking days* after the *trade date*. Foreign-exchange spot transactions are used for outright exchange of kroner and foreign exchange. See also *Spot transaction*.

Foreign-exchange swap

A contract between two parties to swap payments in different currencies during a certain period. In the *money* and *foreign-exchange markets* a distinction is made between FX swaps and currency swaps.

FX swaps are loans in one currency against collateral denominated in another currency. An FX swap can be seen as a simultaneous *spot transaction* and *forward contract* in foreign exchange. On *settlement* of the spot transaction one currency is exchanged for another currency, and vice versa when the forward contract is settled. The rate of interest on the loan is reflected in the spot and forward rates applied. FX swaps with one leg in kroner can be seen as a money-market product in the form of a krone-denominated loan against collateral in foreign exchange. In the Danish *money market* FX swaps are traded with standardised maturities from 1 day up to 12 months.

Currency swaps are foreign-exchange swaps that entail ongoing exchange of interest payments and a swap of principals in different currencies at the beginning and end of the contract term. A currency swap can thus be seen as the exchange of loans in different currencies.

Forward contract

A forward contract is a contract between two parties giving the holder of the contract the right and the obligation to buy or sell an underlying asset at a specified time in the future (the expiry date of the forward contract) at a pre-specified forward price. See also *Forward foreign-exchange contract*.

Forward foreign-exchange contract

Foreign-exchange transaction for *settlement* later than two *banking days* after conclusion of the contract. *Forward contracts* may be used by companies to hedge the exchange-rate risk associated with their transactions. If an export company knows that it will receive dollars in six months' time, it can sell this future dollar revenue forward in order to fix the value of the revenue in kroner in advance. The company can thus immunise itself against exchange-rate fluctuations. Likewise, non-residents holding krone-denominated bonds can hedge their positions by selling the future krone-denominated payments from the bonds on forward terms.

FRA (Forward Rate Agreement)

Agreement to pay interest on a fictive principal at an agreed rate for an agreed future period. In Denmark standardised FRAs run for 3 or 6 months. At the beginning of the future period, *difference settlement* takes place of an amount equivalent to the difference between the agreed reference interest rate (e.g. *CIBOR*) and the agreed FRA rate on the fictive principal. No payments are exchanged on the conclusion of the actual contract.

FRAs are used to e.g. hedge against interest-rate risks. If a bank wishes to be certain of achieving financing at the current FRA rate in a future period, the bank can purchase an FRA now and raise a loan at the market rate (*CIBOR*) for the future period. If *CIBOR* for the future period exceeds the agreed FRA rate, the bank will – via the FRA – receive an amount to compensate for the difference.

Futures

A future is a *forward contract* that is standardised with regard to the underlying instrument, maturity date, contract size and other contract

terms. Due to this standardisation, futures (unlike other forward contracts) are suitable for trading on exchanges.

FX swap

See *Foreign-exchange swap*.

Gross domestic financing requirement (central government's)

Compiled as the *gross financing requirement* less redemptions on the government's foreign debt. Corresponds to the central government's current net disbursements (deficit) plus redemptions on the domestic government debt and the net bond purchases of the *Social Pension Fund*.

Gross financing requirement (central government's)

The gross financing requirement is compiled as the current expenditure of less receipts to the central government, with the addition of redemptions on the domestic and foreign debt, and the net bond purchases of the *Social Pension Fund (SPF)*. See also *Gross domestic financing requirement*.

Haircut

The deduction made from a paper's market value on determining its collateral value. Used in connection with Denmark's Nationalbank's *monetary-policy lending* to minimise the risk that the value of the counterparty's loan exceeds the value of the pledged securities.

Hedge fund

Investment company with an investment strategy that often entails a considerable element of speculation and a high rate of borrowing in relation to its equity capital.

IMF (the International Monetary Fund)

International organisation established to promote international monetary cooperation and exchange stability, foster international trade, ensure high levels of employment and real income, contribute to free and unimpeded payments between member countries, and grant loans to member countries experiencing balance-of-payments difficulties.

Interest-rate derivatives

Interest-rate *derivatives* are financial contracts used by banks, business enterprises and investors to hedge interest-rate risks and to take positions. The most important interest-rate derivatives in the Danish *money market* are *FRA*s and short-term *interest-rate swaps*.

Interest-rate swap

Agreement between two parties for the future exchange of interest payments for an agreed period on the basis of a fictive principal. Fixed-rate payments (the *swap rate* for the maturity in question) are often exchanged for floating-rate payments. A bank with e.g. floating-rate deposits can use interest-rate swaps to exchange the floating-rate payments for fixed-rate payments. For the deposit and interest-rate swap taken as one, this corresponds to the bank converting its interest-rate exposure from floating-rate deposits to fixed-rate deposits. See also *T/N IRS*.

Intervention (in the foreign-exchange market)

Term used for Danmarks Nationalbank's purchase and sale of foreign exchange for and from the *foreign-exchange reserve* in order to stabilise the krone vis-à-vis the *euro*. When Danmarks Nationalbank sells foreign exchange (and purchases kroner) in the *foreign-exchange market*, the krone will have a tendency to strengthen. When Danmarks Nationalbank buys foreign exchange (and sells kroner), the krone will have a tendency to weaken.

Within the framework of ERM II a distinction is made between two types of intervention.

Intervention that takes place when the exchange rate for the krone vis-à-vis the euro is within the fluctuation band of +/- 2.25 per cent around the *central rate* is denoted intramarginal intervention. Intramarginal intervention can be conducted by Danmarks Nationalbank or as coordinated intervention agreed between Danmarks Nationalbank and the *ECB*.

Intervention at the margin is the term used for intervention that takes place if the exchange rate for the krone vis-à-vis the euro reaches the upper or lower margin of the fluctuation band around the central rate. In this case both Danmarks Nationalbank and the *ECB* have an obligation to intervene. The *ECB* and Danmarks Nationalbank may, however, suspend intervention if it is in conflict with the primary monetary-policy objective.

Intraday credit

Loans offered for a period of less than one *banking day* within the same *monetary-policy day*.

Kronos

Danmarks Nationalbank's payment system via which significant daily *liquidity* transfers take place among banks and mortgage-credit institutes.

Lending rate

The rate of interest for *monetary-policy loans* in Denmark's Nationalbank's regular *market operations* in which the *monetary-policy counterparties* may borrow usually with a maturity of 14 days against securities as collateral. The lending rate is equal to the *rate of interest for certificates of deposit*.

Liquidity

In Denmark the key liquidity concept in *monetary policy* is the *current-account deposits* of the *monetary-policy counterparties*, since these funds can be used immediately as a means of payment at the initiative of the account holders. Current-account deposits are therefore often referred to as "liquidity", "current-account liquidity" or "krone liquidity". The key liquidity concept in payment systems is the sum of current-account balances and current-account overdrafts within the day (*intra-day credit*).

Margin

General excess collateral in connection with a loan. Used in Denmark's Nationalbank's *monetary-policy lending* where a margin of 2 per cent is required. This means that collateral for a value of at least kr. 102 must be provided for a loan of kr. 100. The collateral value is calculated as the market value of the securities less a *haircut*.

Marginal lending facility

A facility in the *Eurosystem* which the monetary-policy counterparties may use at their own initiative to obtain overnight credit against collateral at a pre-specified interest rate. Also called a Lombard facility.

Marginal rate

The lowest interest rate at which liquidity is granted in the weekly main refinancing operations in the *euro area*. See *Market operations*.

Market conventions

Conventions for trading in financial contracts and interest calculation. In the Danish *money* and *foreign-exchange markets* the *settlement date* (value date) is normally two *banking days* after the *trade date* (t+2) on which the contract is concluded. The yield to maturity in per cent p.a. is calculated according to the money-market convention on the basis of the day-count convention "actual/360", with simple accrual of interest (no compound interest). In the Danish bond market the settlement date

for a transaction is normally three business days after the trade date ($t+3$).

Market maker

A number of banks have concluded mutual agreements on market making in the various segments of the *money market* and the *foreign-exchange market*. Market makers continuously set binding two-way prices vis-à-vis each other for fixed amounts in a number of specific products. Market making contributes to limiting the spread between bid and offer prices.

Market operations (Danmarks Nationalbank's)

Weekly market operations whereby the *monetary-policy counterparties* can borrow *liquidity* against securities as collateral (*monetary-policy loans*) or make placements by purchasing *certificates of deposit*. These transactions usually have a maturity of 14 days. Furthermore, Danmarks Nationalbank may need to provide liquidity to the market outside the regular market operations. These extraordinary market operations normally take place as the purchase and sale of certificates of deposit.

Market operations (the Eurosystem's)

Provision of liquidity to the banking system by the *Eurosystem* takes place primarily via weekly main refinancing operations conducted as *tenders* at which bids are collected via the national central banks in the *euro area*.

Liquidity is provided as lending against securities as collateral, and the loans normally have a maturity of two weeks. The Eurosystem also provides liquidity via longer-term refinancing operations conducted as monthly tenders for loans with a maturity of three months. In addition, the Eurosystem may conduct fine-tuning operations to smooth out interest-rate fluctuations, particularly those caused by unexpected liquidity fluctuations. Finally, the Eurosystem may conduct structural operations to adjust its net position vis-à-vis the financial sector over a prolonged period.

In January 2003 the *ECB* announced that the maturity of lending in the weekly main refinancing operations will be reduced from 14 days to 1 week in the 1st quarter of 2004.

MFI (Monetary Financial Institution)

Used as an aggregate term for banks and mortgage-credit institutes and *money-market funds*, etc. in e.g. Danmarks Nationalbank's financial statistics.

Minimum bid rate

The lowest rate at which the monetary-policy counterparties can submit bids in the *Eurosystem's* weekly main refinancing operations. The minimum bid rate is the *ECB's* key monetary-policy interest rate.

Monetary and foreign-exchange policy

As the Danish central bank Danmarks Nationalbank is responsible for monetary policy in Denmark. Danmarks Nationalbank conducts monetary policy by determining the *monetary-policy interest rates*, i.e. the *discount rate*, the *current-account rate* and the *lending rate* (equal to the *rate of interest for certificates of deposit*). Danmarks Nationalbank's interest rates guide the short-term interest rates in the Danish *money market*, as well as the deposit and lending rates that the banks offer customers.

Denmark conducts a fixed-exchange-rate policy vis-à-vis the *euro*. This means that the objective of monetary and foreign-exchange policy is to keep the Danish krone stable against the euro. Other factors besides the exchange rate, such as cyclical development in Denmark, are not included in the monetary-policy considerations.

Monetary financing

Financing of government budget deficits via direct or indirect credit extension by the central bank. In order to avoid monetary financing, the EU Treaty prohibits credit facilities with the central bank in favour of the central government. The Treaty also prohibits the central bank's purchase of government securities directly from the central government. In Denmark the framework for central-government borrowing also includes the *norm for central-government borrowing*.

Monetary-policy counterparties

Danmarks Nationalbank's monetary-policy counterparties are banks and mortgage-credit institutes that operate under respectively the Commercial Banks and Savings Banks Act and the Mortgage Credit Act and meet certain technical criteria. Danmarks Nationalbank may also give Danish branches of foreign credit institutions conducting equivalent business access to the *monetary-policy instruments*. Danmarks Nationalbank selects its monetary-policy counterparties on the basis of monetary-policy considerations.

Monetary-policy day

The monetary-policy day runs from 4.00 p.m. to 3.30 p.m. on the following *banking day*.

Monetary-policy instruments

This term covers the facilities used by a central bank to manage and service accounts with the monetary-policy counterparties. Danmarks Nationalbank's *monetary-policy counterparties* are banks and mortgage-credit institutes. They have access to place *liquidity* with Danmarks Nationalbank as overnight deposits (*current-account* deposits), and to participate in Danmarks Nationalbank's *market operations*.

Monetary-policy interest rates

These are the *discount rate* and the rates of interest for Danmarks Nationalbank's balances with the *monetary-policy counterparties*, i.e. the *current-account rate* and the *lending rate* (which is equal to the *rate of interest for certificates of deposit*). The lending rate is the rate of interest for *monetary-policy loans*. *Current-account* deposits accrue interest at the *current-account rate*, which from April 1992 to date (early June 2003) has been equal to the *discount rate*. The current-account rate is lower than the lending rate.

Monetary-policy lending

Lending in Danmarks Nationalbank's regular *market operations* whereby the *monetary-policy counterparties* can normally raise 14-day loans against securities as collateral.

Monetary-policy loans

See *Monetary-policy lending*.

Money market

The Danish money market is the interbank market for loan agreements and *interest-rate derivatives* in kroner with a maturity of up to one year. The money market is used for the exchange of *liquidity* between market participants and for management of short-term interest-rate positions. A well-functioning money market is important to ensure a clear transmission of Danmarks Nationalbank's *monetary-policy interest rates* to the short-term market interest rates. See also *Deposits, Repos and Foreign-exchange swaps*.

Money-market broker

Money-market brokers are intermediaries who do not themselves take positions, but solely establish contact between agents supplying and demanding money-market products. On an anonymous basis, the brokers continuously state the best bid and offer prices in the individual

products for standardised maturities on the basis of rates provided by the individual banks.

Money-market fund

Investment association investing in bank deposits and *money-market* related securities.

Money supply (M3)

The money supply consists of bank deposits made by private individuals and business enterprises, and their holdings of banknotes and coins and certain short-term bonds.

Net position

The *monetary-policy counterparties'* monetary-policy balance with Danmarks Nationalbank. Calculated as the counterparties' *current-account* balances with addition of placements in *certificates of deposit* less *monetary-policy loans* from Danmarks Nationalbank.

Norm for central-government borrowing

Agreement between the government and Danmarks Nationalbank on the scope and distribution of central-government borrowing in kroner and in foreign currency. The main feature of the agreement is that the central government's *gross domestic financing requirement*, i.e. the central government's current deficit and redemptions on the domestic debt in a given financial year, is in principle financed by krone-denominated borrowing. The norm for foreign borrowing entails that the redemptions on the foreign debt in a given financial year are in principle re-financed by borrowing in foreign currency. The purpose of the central government's foreign borrowing is to ensure an adequate *foreign-exchange reserve*.

Options

Contract between two parties giving the buyer of the option a right, but not an obligation, to buy or sell an underlying asset for an agreed price (contract price, exercise price or strike price) before or on a specific future expiry date. The buyer of the option pays the seller a premium on conclusion of the contract in return for this right.

An option giving the buyer the right to buy the underlying asset is a call option. An option giving the buyer the right to sell the underlying asset is a put option.

If the buyer may exercise the option at any time up to the expiry date, it is called an "American option". If the buyer may only exercise the op-

tion on the expiry date, it is called a "European option". See also *Foreign-exchange option*.

OTC (Over-The-Counter)

Trading in financial products outside the exchanges.

Overnight interest rate

Rate of interest for a loan with a maturity of one *banking day*. The overnight (O/N) interest rate applies to a loan commencing on the *trade date* and expiring on the following banking day. The tomorrow/next (T/N) interest rate applies to a loan commencing on the 1st banking day after the trade date and expiring on the 2nd banking day after the trade date. The spot/next (S/N) interest rate applies to a loan commencing on the 2nd banking day after the trade date and expiring on the 3rd banking day after the trade date. See also *T/N interest rate* and *EONIA*.

Par

Equal to the nominal value of a security.

Payment versus payment

Settlement principle by which both parties to e.g. a currency trade first pay their part of the trade before the payments are exchanged. See also *Settlement* and *CLS*.

Pips

Pips refers to the spread between the bid and offer prices for foreign currency. For example, a spread of 5 pips on the krone's rate against the *euro* entails a spread of kr. 0.05 per 100 euro between the bid and offer rates.

Rate of interest for certificates of deposit

Certificates of deposit are *zero-coupon papers* issued by Danmarks Nationalbank. The interest rate corresponds to the difference between the redemption price (*par*) and the bid price. See also *Lending rate*.

Real-Time Gross Settlement (RTGS)

Settlement principle in a payment system whereby the payments are settled individually, immediately and finally to the participants' accounts. See also *Settlement*.

Repos (repurchase agreements)

Repos are collateralised loans that are traded on the Danish *money market* with standardised maturities from 1 day up to 6 months. The

pledged collateral comprises securities, typically bonds. Repos are also known as sell and buy-back transactions since on the conclusion of the agreement the seller of the bonds (the *liquidity* recipient) at the same time enters into an obligation to repurchase the securities at a later date for a price fixed when the agreement is entered into. The repo rate is reflected in the difference between the agreed spot and forward prices.

Repurchase agreements

See *Repos*.

Reserve requirement

A requirement for monetary-policy counterparties to hold minimum reserves on accounts with the central bank.

Under the minimum reserve system of the Eurosystem credit institutions in the euro area are obliged to deposit an amount corresponding to 2 per cent of selected liabilities with the national central banks. The reserve requirement must be met on average over a reserve maintenance period of one month. The required reserves are remunerated at the average *marginal rate* applying to the main refinancing operations in the reserve maintenance period.

The Eurosystem's minimum reserve system serves two purposes. Firstly, it helps to stabilise the *overnight interest rate* since the counterparties have an incentive to lend liquidity in the market when the overnight interest rate is higher than the rate of interest on the required reserves. On the other hand, the counterparties have an incentive to maintain ample reserves in the periods when the overnight interest rate is lower than the rate of interest on the required reserves. Secondly, the minimum reserve system helps to ensure that the counterparties have a structural liquidity deficit vis-à-vis the Eurosystem, which is assumed to enhance the transmission from the monetary-policy interest rates to the market interest rates.

Residents and non-residents

Pursuant to the Danish Order on Foreign Exchange residents are natural persons or legal entities resident in Denmark. Non-residents are natural persons or legal entities not resident in Denmark.

Settlement

Exchange of services to fulfil the parties' obligations under a financial contract.

For example, trading of securities registered at *VP Securities Services* is settled by compiling the participants' positions in securities and money respectively several times a day. Danmarks Nationalbank is responsible for the settlement of the money side of the trades. In principle, a securities trade is settled by drawing on the buyer's *current account* at Danmarks Nationalbank and registering the purchase to the buyer's securities account at *VP Securities Services*. The money side is settled simultaneously with the securities side. This ensures the availability of both money and securities.

Settlement account

An account held by a direct participant in the payment system at Danmarks Nationalbank with a view to *settlement* of payments.

Settlement date

The day of *settlement* of a financial transaction. Settlement may take place on the *trade date* (same-day settlement) or one or several days after the trade date. The settlement date is also called the value date. See also *Market conventions*.

Social Pension Fund (SPF)

The Danish Social Pension Fund (SPF) was established in 1970 by the Social Pension Fund Act, whereby a special national retirement pension contribution was introduced. The proceeds were allocated to SPF and invested in bonds. With effect from 1982 the Act was amended, and the payments to SPF ceased. SPF was continued as an asset of the central government. SPF is part of the remit of the Ministry of Social Affairs and the Ministry of Finance. The management of SPF's capital is handled by a committee with representatives from the Ministry of Finance, the Ministry of Social Affairs and Danmarks Nationalbank. The day-to-day management of the assets of SPF is handled by Government Debt Management at Danmarks Nationalbank.

Spot transaction

In the *money* and *foreign-exchange markets* a spot transaction is a contract between two parties on purchase or sale of a financial asset for *settlement* no later than *2 banking days* after the *trade date*. See also *Foreign-exchange spot transaction*.

Stability and Growth Pact

EU pact according to which all EU member states are to ensure a budgetary position close to balance or in surplus in the medium term.

Sumclearing

Danish payment system for settlement of e.g. retail payments between banks, including cheques, Dankort (debit card) transactions and transfers via BetalingsService (direct debit).

Swap rate

The swap rate is the fixed interest rate in an *interest-rate swap*.

SWIFT

International financial network used for exchanging payment messages.

T/N IRS (Tomorrow/Next Interest Rate Swap)

T/N IRS is a short-term *interest-rate swap* applying the *T/N rate* as the reference interest rate. When a T/N interest-rate swap is concluded the parties in principle agree to exchange the payment of interest at a fixed rate (the *swap rate* for the maturity in question) for the payment of interest at a floating overnight rate (the T/N rate). The interest payments are calculated on the basis of a fictive principal. The agreement can be concluded for standardised maturities of between 1 and 12 months. On expiry of the swap, the parties' gains and losses are settled (*difference settlement*) via the exchange of a net amount. The term "CITA swap" is often used synonymously with "T/N IRS" (CITA is an abbreviation of Copenhagen Interest T/n Average).

T/N rate (Tomorrow/Next interest rate)

Reference interest rate in the Danish *money market* in a number of financial contracts. The T/N rate is a rate of interest for an overnight loan running from the 1st *banking day* after the *trade date* to the 2nd banking day after the trade date. The T/N rate is determined on the basis of data reported to Danmarks Nationalbank by currently 13 major players in the Danish *money market*. See also *T/N IRS*.

Tender

A monetary-policy procedure whereby the central bank provides (absorbs) *liquidity* to (from) the market on the basis of competitive bids submitted by the monetary-policy counterparties.

In the period from 28 June 2000 until now (early June 2003) the *Eurosystem's* main refinancing operations have been conducted as variable-rate tenders. At the tenders the counterparties submit bids for both interest rates and amounts. Bids with the highest interest rates are accommodated first, and the interest rate that is bid applies. The *ECB* successively accepts bids for lower interest rates until the desired amount

has been allotted. The lowest interest rate at which liquidity is allotted is known as the *marginal rate*, and liquidity may be allotted on a pro-rata basis at this interest rate. The individual counterparty hereby receives liquidity in relation to its bid at the marginal rate as a proportion of the counterparties' total amount bid at the marginal rate. Prior to the variable-rate tenders the Governing Council of the ECB announces a *minimum bid rate* which is the lowest interest rate at which bids from the counterparties will be accepted. The minimum bid rate is the ECB's key monetary-policy interest rate.

Trade date

The date on which a contract for a financial transaction (e.g. a krone-denominated loan or a currency trade) is concluded between two counterparties. Also called trading day.

Trading day

See *Trade date*.

Value date

See *Settlement date*.

VP Securities Services (VP)

Institution in the Danish securities market. VP's most important tasks are to undertake the computerised issue of securities, to book-enter ownership and rights in relation to electronic securities, and to undertake the *clearing* and *settlement* of securities transactions.

VP System

VP Securities Services' system for *settlement* of trades and other payments (e.g. interest and redemption payments) in connection with securities registered by VP Securities Services.

Zero-coupon paper

Loan without coupon interest, for which redemption payment falls due on expiry. The *certificates of deposit* issued by Danmarks Nationalbank are zero-coupon papers.