

Background paper to the speech held by former member of the Board of Governors of Danmarks Nationalbank, Jens Thomsen, at the SUEF and National Bank of Poland Conference on “Monetary Policy after the Crisis”, National Bank of Poland, Warsaw, 4 March 2011

## **Monetary Policy after the Crisis - Ten Lessons from a Fixed-Exchange-Rate Regime**

### **A SHORT REVIEW OF THE RULES OF THE GAME IN A FIXED EXCHANGE-RATE REGIME**

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Although there is a high degree of consensus in terms of monetary-policy objectives (price stability) and instruments (the short-term interest rate), central banks still apply different strategies and approaches in implementation of monetary policy.

Denmark has conducted a fixed-exchange-rate policy since the 1980s, cf. Chart 1 and 2. Several other small European countries also pursued a fixed-exchange-rate strategy in the 1980s and the early 1990s but have since then opted for regimes based on explicit inflation targets or joined the euro area. Due to the fixed-exchange-rate policy, the Danish monetary policy is aimed at keeping the krone stable against the euro within the European Exchange Rate Mechanism, ERM. The main objective of monetary policy in the euro area is to maintain an inflation rate of below, but close to, 2 per cent. Linking the Danish krone to the euro creates a basis for achieving the same level of inflation and inflation expectations in Denmark as in the euro area, cf. Chart 3.

Having the exchange rate as the intermediate target provides a simple and unambiguous rule for monetary policy in Denmark (Danmarks Nationalbank, 2009). Danmarks Nationalbank's interest rates normally mirror those fixed by the ECB for the euro area. Minor fluctuations in the exchange rate is addressed by purchasing and selling foreign exchange against kroner (intervention), cf. Chart 4. If there is a prolonged tendency for the krone to strengthen or weaken, Danmarks Nationalbank unilaterally adjusts its interest rates. Weakening of the krone can be countered by raising Danmarks Nationalbank's interest rates relative to those of the ECB, since it is more attractive to invest in kroner when the rate of interest is higher, cf. Chart 5. Conversely, Danmarks Nationalbank may counter a tendency for the krone to strengthen by reducing its interest rates.

In a fixed-exchange-rate regime the monetary-policy interest rates are reserved for managing the exchange rate. In a world with free capital flows this leaves no scope for using the monetary policy interest rate as an instrument for stabilising the domestic business cycle (McKinnon, 1993; Obstfeld, Shambaugh & Taylor, 2005). Since

monetary policy cannot be used for cyclical purposes, it is important that both fiscal policy and other economic policies are oriented towards economic stability so that both overheating and high unemployment is addressed.

Times of international financial turmoil often constitute an acid test of fixed exchange-rate regimes. This lesson was learned the hard way during the crisis in the European Monetary System in the early 1990s where several countries had to abandon a fixed exchange rate regime and opt for inflation targeting.

The Danish fixed exchange rate policy survived the crisis in the early 1990 and has served the Danish economy well during the last couple of decades (Abildgren *et al.*, 2010). The paper at hand reviews the Danish monetary and foreign-exchange policy during the financial crisis in 2008 where the Danish fixed exchange-rate peg came under pressure.

There seems to be ten general lessons to learn from the crisis regarding the art of conducting a successful monetary policy in a fixed-exchange-rate regime. None of these lessons are new. However, since currency crises and banking crises are low probability events (“tail events”) a review of the lessons might be of interest.

Before the review two more general issues should be mentioned. First, even though Denmark has chosen a different monetary-policy strategy from that of other smaller European countries, the outcome is not necessary significantly different. This can be illustrated by the economic development in the Nordic countries since the middle of the 1990s. During this period, the Nordic countries have pursued different monetary-policy strategies:

- Denmark has conducted a fixed-exchange-rate policy against the D-mark and, from 1999, the euro.
- Finland switched to an inflation target in 1993. In 1996 it joined the ERM, and in 1999 it adopted the single European currency, the euro.
- Sweden has chosen to operate within the framework of an inflation target regime since 1995.
- Norway operated with a trade-weighted exchange-rate index until 2001, when it also switched to an inflation target.

Despite the different strategies the outcome measured in terms of inflation and output volatility is comparable, cf. Chart 6. It is important to note that there does not seem to be any indications that Denmark's fixed-exchange-rate policy has led to more volatility in the economy compared with the other Nordic countries with other monetary-policy strategies. The development in the long-term interest rates in the four countries is also quite similar, cf. Chart 7.

Second, when comparisons are made between the recent financial crisis and the currency crisis in the ERM in the early 1990s one has to keep in mind that the period since 1990 has been characterised by declining significance of gross payments linked to the current account of the balance of payments compared with gross payments linked to the financial account, cf. Chart 8. In the late 1980s, "current" gross

payments accounted for around 50 per cent of total gross payment flows across Denmark's borders. By the mid 2000s, this share had declined to 14 per cent. Consequently, today capital flows are all-important to the short-term development in the exchange rate of the krone.

### **REDUCED EFFECTIVENESS OF MONETARY- AND FOREIGN- EXCHANGE-POLICY INSTRUMENTS DURING THE FINANCIAL CRISIS**

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The international financial crisis escalated during the autumn of 2008. The Danish krone weakened in September and October 2008 after a period with a negative spread between Danmarks Nationalbank's lending rate and the ECB's allotment rate, cf. Chart 9 (left). The negative interest-rate spread reflected a strong demand from credit institutions in the euro area for liquidity in the ECB's weekly tenders, which led to an increase in the ECB's interest rate. Another factor contributing to the pressure on the krone was the tendency for investors to withdraw from minor currencies, including the Danish krone, as a result of the intensified financial crisis. There were also rumours in the market that certain foreign investors were speculating against the krone, e.g. via FX options.

To stabilise the krone, Danmarks Nationalbank intervened in the foreign-exchange market for considerable amounts in the late September and early October 2008. However, this proved insufficient to withstand the pressure on the krone, and in accordance with the rules of the game in a fixed-exchange-rate policy Danmarks Nationalbank unilaterally raised its monetary-policy interest rates, whereby the spread to the euro area widened. With effect from 8 October 2008, the lending rate was raised by 0.4 percentage point, thereby increasing the spread between the monetary-policy interest rates in Denmark and the euro area to 0.75 percentage point.

However, Danmarks Nationalbank continued to intervene in the foreign-exchange market after the interest-rate increase. At midday on 8 October, the ECB announced its decision to lower interest rates by 0.5 percentage point, citing the intensifying financial crisis as the background. Since Danmarks Nationalbank maintained its monetary-policy interest rates, the spread between the monetary-policy interest rates in Denmark and the euro area widened further.

Despite this widening, the krone was still under pressure due to the outflow of foreign exchange. This prompted Danmarks Nationalbank to intervene again at the end of October. The net intervention sale of foreign exchange with settlement in October 2008 totalled DKK 64 billion, cf. Chart 9 (right) and Table 1. As a memorandum item it can be mentioned that the net intervention sale of foreign exchange with trading day in July 1993 totalled DKK 50 billion

On 24 October, Danmarks Nationalbank raised the lending rate by a further 0.5 percentage point, thus widening the spread to the ECB's interest rate to 1.75 percentage points. This proved sufficient to stabilise the krone again. The krone strength-

ened from the end of October, and Danmarks Nationalbank was able to buy back foreign exchange over the subsequent months. This enabled Danmarks Nationalbank gradually to reduce its monetary-policy interest rates again, thus narrowing the spread to the ECB.

***Lesson 1: FX interventions can only be used to smooth out minor fluctuations in the exchange rate when the foreign exchange markets are calm. When faced with a strong pressure on the currency in a fixed-exchange-rate regime a swift and sizeable increase in the interest-rate spread vis-à-vis the currency anchor is required.***

The large amounts of interventions in support of the Danish krone and the sizable increase in the interest-rate spread vis-à-vis the euro area that was necessary to stabilise the krone clearly illustrates that the interest sensitivity of portfolio capital flows was very low during the crisis in the autumn of 2008. In times without turmoil on the foreign-exchange markets the interest-rate sensitivity is usually substantial higher. A recent example occurred in February 2006, where the Nationalbank raised its lending rate by just 0.1 percentage point. This unilateral interest-rate increase was modest but nevertheless sufficient to stabilise the krone even though the Nationalbank prior to the interest-rate hike had sold foreign exchange for substantial amounts (DKK 34 billion) in order to stabilise the krone.

***Lesson 2: The interest sensitivity of portfolio capital flows is regime dependent. During financial turmoil interest-rate sensitivity of capital flows can decline substantially.***

At the peak of the crisis in October 2008 the size of the Nationalbank's foreign-exchange reserve also came into focus. Rumours were circulating in the market that the Nationalbank had insufficient reserves to maintain the fixed-exchange-rate peg. In the month after October 2008 the Nationalbank chose to increase the size of the foreign exchange reserve in order to send a strong signal to the market regarding the commitment to the fixed exchange rate peg, cf. Chart 10. In this connection it should also be noted that the Nationalbank since the second half of the 1990s has chosen to stabilise the krone-rate at a level close to its central rate within the ERM. The ERM rules on automatic and unlimited intervention credit apply only at the intervention limits.

***Lesson 3: The size of the foreign-exchange reserves plays an important role in signalling commitment to the fixed-exchange-rate regimes during periods with turmoil on the FX markets.***

History has shown that banking crisis and currency crisis often occur together as “twin crisis” (Allen & Gale, 2007; Reinhart & Rogoff, 2009). This was also the case for Denmark in October 2008, and naturally it presented a challenge to communicate the need to raise interest rates in Denmark at a time when other central banks around the world were lowering theirs to support the financial sector in order to address the international financial crisis.

***Lesson 4: The proper interest-rate response in a fixed-exchange-rate regime during times of crisis is rarely a convenient and popular move.***

## **DYSFUNCTIONAL INTERNATIONAL FINANCIAL MARKETS**

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The substantial intervention sales in October 2008 drained the foreign-exchange reserve. In previous crises, it had been possible immediately to increase the reserves by issuing short-term Kingdom of Denmark commercial papers and later replacing these by longer-term loans if necessary, cf. Chart 11 for a case study of 1993.

However, the experience from the autumn of 2008 showed that it was not always possible to raise large amount of foreign exchange within a short timeframe via the CP market. Furthermore, it took quite a while before the government was able to raise longer-term foreign loans at acceptable prices. Borrowings at a too high interest rate entailed a risk of signaling an urgent need for foreign exchange and thereby intensify the pressure on the krone.

***Lesson 5: When they are needed the most foreign exchange reserves can be difficult to obtain.***

The foreign-exchange reserve is, in principle, an expense to Danmarks Nationalbank. The reason is that the foreign-exchange reserve is offset by interest-bearing loans in Danish kroner – either from banks or from the central government – while most of the foreign-exchange reserve is remunerated at the short-term euro rate, which is lower than the short-term rate of interest in Denmark. During time of pressure on the krone the short-term interest-rate differential widens. This increases the cost of holding FX reserves and the sizable increase of the foreign-exchange reserve has reduced the net profit of the Nationalbank substantially. In May 2009, it was therefore decided temporary (until end-2010) to reduce the interest payable on the central government's deposit at the Nationalbank.

***Lesson 6: The costs of holding foreign exchange reserves are low when the reserves are not needed (times without currency turmoil) and expensive when they are needed (during periods of currency turmoil).***

The dysfunctional international financial markets made it also difficult for private banks in Denmark and other countries to obtain the necessary dollar and euro liquidity. In September and October 2008 Danmarks Nationalbank intervened in the FX swap market in order to ease the access to liquidity in foreign currency in the Danish banking sector. On 18 September dollars were offered against kroner for a total of DKK 3 billion with a maturity of 7 days. Likewise, in early October, Danmarks Nationalbank intervened in the euro market, offering euro for a total of DKK 17 billion with maturities of 7 days and 1 month (Bernstein, 2010).

The intervention in the FX swap market turned out to have only a temporary impact on the market. The Danish market for euro and dollar liquidity is considerable, and intervention in the FX swap market also reduces the foreign-exchange reserve.

Danmarks Nationalbank was able to establish a swap line (fully collateralised) with the US Federal Reserve on 24 September 2008. The needs for this facility was highlighted by the fact that volumes offered at dollar auctions were drawn upon in full. On 27 October 2008, Danmarks Nationalbank and the ECB established an equivalent swap line for EUR 12 billion. Although this limit was not reached, it eased the access to euro liquidity for Danish banks significantly. The swap facilities were thus very helpful in addressing the banks' needs for liquidity in dollars and euro. Furthermore, the swap-line with the ECB in October sent a strong signal to the market regarding the commitment to the fixed exchange rate peg vis-à-vis the euro.

*Lesson 7: The swap arrangements between the central banks during the crisis were a success.*

## **THE FUNCTIONING OF THE MONEY MARKET, UNCONVENTIONAL MONETARY-POLICY INSTRUMENTS AND GOVERNMENT GUARANTEES**

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The financial crisis generated tensions in the money market in several countries, including Denmark. Loss of confidence between the banks led to restraint on uncollateralised lending in the money markets. The market players sought to safeguard their own liquidity and hesitated to grant loans to counterparties, particularly at long maturities. The spread between collateralised and uncollateralised 3-month money market interest rates multiplied, cf. Chart 12.

In connection with the financial turmoil Danmarks Nationalbank expanded its collateral base to facilitate pledging of collateral by monetary-policy counterparties, thereby providing increased access to monetary-policy loans. Furthermore, temporary emergency lending facilities were established. Most of these measures were implemented during the spring and summer of 2008 and eased the bank's access to krone liquidity, especially prior to the establishment of government guarantees for the banking sector, cf. below.

The experience seems to have been similar in other countries. The Financial Stability Forum, which comprises, among others, the ministries of finance, central banks and financial supervisory authorities of the major economies, has conducted an analysis of the factors and the underlying weaknesses in the financial system that led to the outbreak of financial turmoil in the summer of 2007. In its report, it encouraged central banks to ensure that their operational frameworks are sufficiently flexible to address extraordinary situations (Financial Stability Forum, 2008a and 2008b).

***Lesson 8: The operational framework for monetary policy implementation must be sufficiently flexible to address extraordinary liquidity situations in the money market.***

However, the financial crisis escalated in September 2008 when the US government took control of the mortgage giants, Freddie Mac and Fannie Mae, and the investment bank Lehman Brothers filed for bankruptcy (Chapter 11). This sent shockwaves through the financial markets as they had expected a bailout along the same lines as the Bear Stearns case in the spring of 2008.

It became clear that the international financial crisis was a real threat to financial stability worldwide. At the same time, it had moved beyond a liquidity crisis that central banks could alleviate by providing liquidity to the markets. The crisis had deeper roots, the banks' capital adequacy was called into question, and quite extraordinary measures were needed in order to restore stability and confidence in the financial markets.

In Europe, Ireland was the first country to provide a government guarantee for the banking sector. The Irish government guarantee created a snowball effect throughout Europe, and the other EU member states, including Denmark, had to issue guarantees for their banking sectors – wholly or partially, cf. Danmarks Nationalbank (2008).

On 5 October 2008, the Danish Contingency Association concluded an agreement on financial stability (Bank Rescue Package) with the Danish government. Under the agreement, the government provided an unlimited guarantee to all depositors and other unsecured creditors in banks in the Kingdom of Denmark. The guarantee was not a free lunch for the banks, however. The payments from the Danish Contingency Association under Bank Rescue Package constituted up to DKK 35 billion. Participation in the government guarantee under Bank Rescue Package was voluntary, but all Danish banking institutions except a few very small institutions joined the scheme.

The need for this initiatives should be viewed against the background of the large deposit deficit (customer funding gap) that had been build up in the Danish banking sector prior to the crisis, cf. Chart 13, mainly reflecting Danish bank's expansion

abroad. This funding gap had to a large extent been financed via foreign lending, including short-term loans from foreign credit institutions.

However, the government guarantees was also very considerably in terms of duration (two years) as well as institutions and claims covered (DKK 4,200 billion or around 2.5 times Denmark's GDP). These guarantees could potentially make large claims on the foreign-exchange reserve increased in case of the failure of a bank with large foreign liabilities. The measures to safeguard financial stability therefore also made a substantial increase in the foreign exchange reserve necessary.

*Lesson 9: Short-term financing through the money and capital markets is generally more sensitive to changes in the banking institutions' own credit standing than deposits are. The banks' dependence on money market financing thus make them vulnerable, particularly to changes in foreign banks' ability and willingness to finance them during times of crisis. If the banking system relies heavily on short-term foreign funding it can have systemic implications and make it necessary for the central bank to operate with a large foreign-exchange reserve, particularly in a fixed-exchange-rate regime.*

#### **THE CHALLENGES AND COST OF BEING OUTSIDE THE EURO IN TIMES OF FINANCIAL CRISIS**

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In calm periods, interest rates in Denmark will be only marginally higher than in the euro area due to the fixed-exchange-rate regime. In turbulent periods such as during the recent financial crisis, the spread tends to widen. Often this widening occur at a rather inopportune time where other negative factors are affecting the real economy. This visualises part the costs of being outside the euro area.

The financial crisis has also highlighted a number of other costs that Denmark has to bear due to the status as a non-euro area EU member state (Bernstein, 2009). At an early stage of the financial crisis the ECB was able to conclude an agreement with the Federal Reserve in order to provide dollar liquidity to euro area banks. It took some time before the Nationalbank was able to present a similar agreement for the Danish banks.

During the crisis the members of the euro area also agreed on standard-setting recommendations for the structure and pricing of government guarantees and capital injections in the banking sector. Denmark was not part of these negotiations and the Danish guarantee scheme did therefore not follow the same standard as in most other EU countries. This made it more difficult to communicate the content and design of the Danish guarantees to international market participants.

The euro area is the second-largest currency in global terms and the ECB is therefore represented in all the important international forums. The regulatory follow-up



on the financial crisis is currently being debated in these forums such as the Basel Committee, the Financial Stability Forum, G20, etc. The outcome of these discussions will have a major impact on the structure of the financial markets and regulation and supervision of financial institution in the years to come. Due to its status as a non-euro area EU member state Denmark's influence on these international negotiations is more limited than is the case in the euro area member states.

***Lesson 10: There is a cost to Denmark of being outside the euro. The cost is most visible during times of crisis.***

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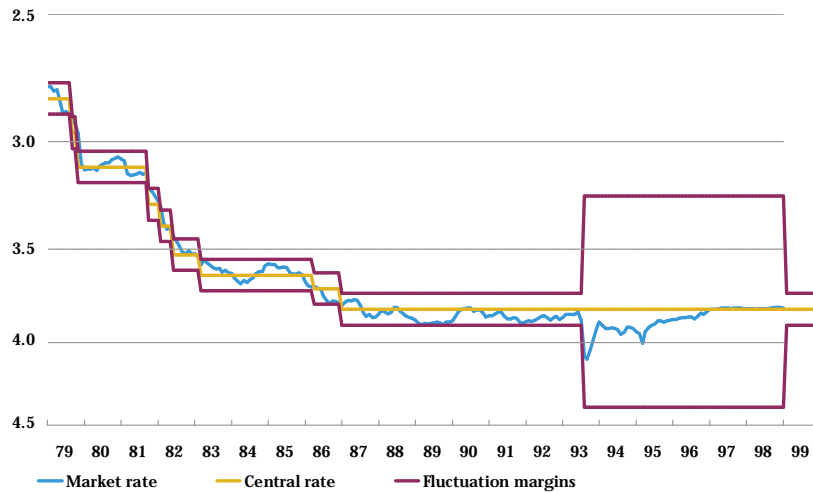
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## CHARTS

EXCHANGE RATE OF THE KRONE VIS-À-VIS THE D-MARK

Chart 1

Kroner per D-mark

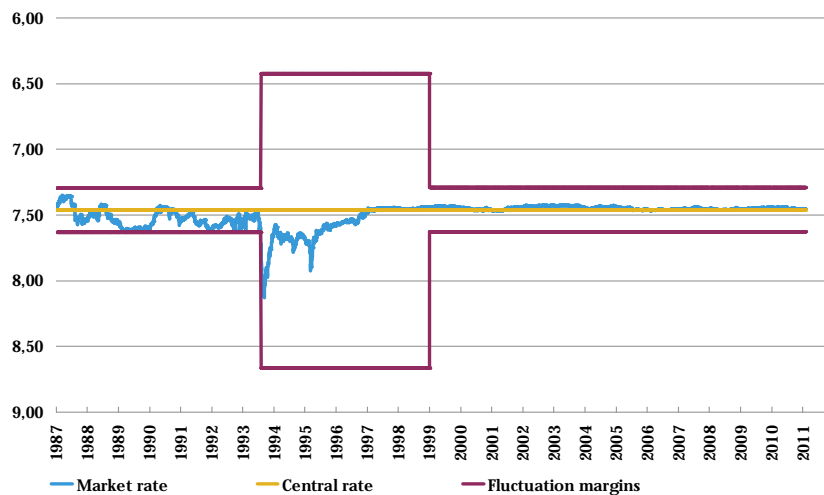


Note: Reverse logarithmic scale.  
Source: Danmarks Nationalbank.

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

Chart 2

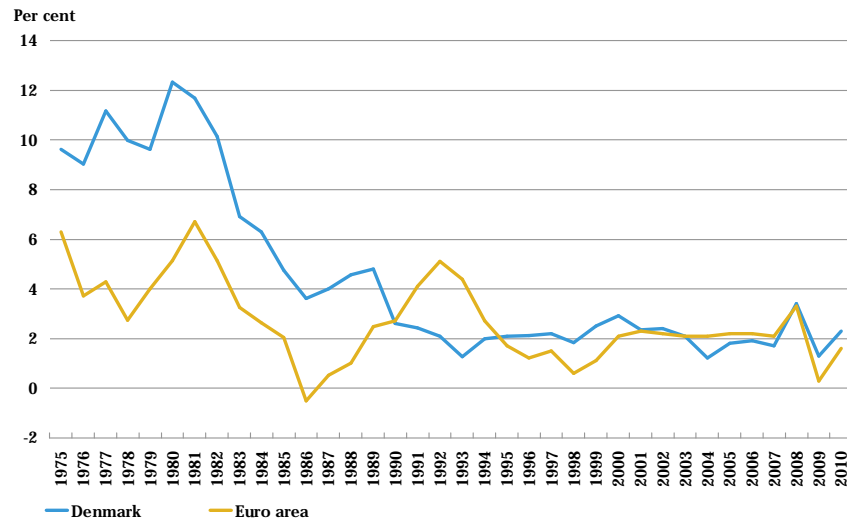
Kroner per euro



Note: Reverse scale. Prior to 1999 a synthetic exchange rate of the krone vis-à-vis the euro has been calculated on the basis of the krone/D-mark rate and the conversion rate between the euro and the D-mark fixed as at 1 January 1999. The earliest observation is from 12 January 1987.  
Source: Danmarks Nationalbank.

CONSUMER PRICE INFLATION

Chart 3

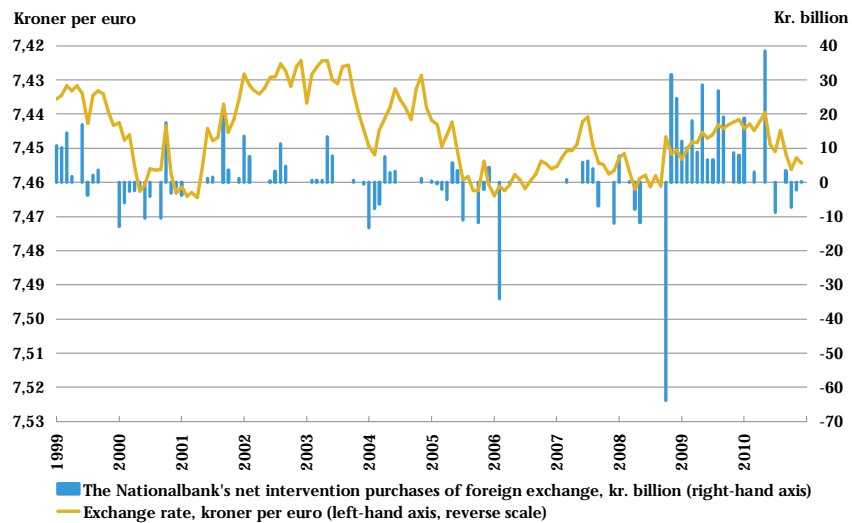


Note: Inflation in the euro area is represented by inflation in West Germany 1975-89 and in Germany 1990-98.

Source: Statistics Denmark, ECB and OECD.

EXCHANGE RATE OF THE KRONE AND INTERVENTION

Chart 4



Note: Monthly data. Interventions have been accrued according to the value date. Exchange rate at month-end. All interventions were performed by Danmarks Nationalbank.

Source: Danmarks Nationalbank.

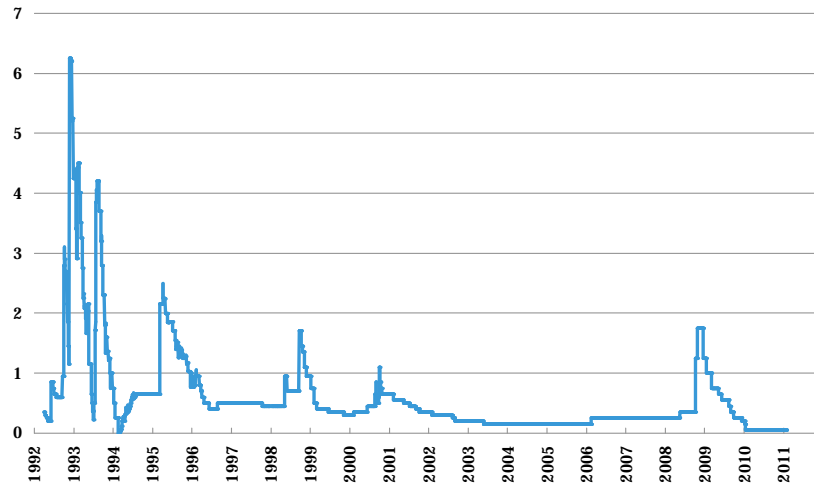
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**MONETARY-POLICY INTEREST-RATE SPREAD BETWEEN DENMARK AND GERMANY (1992-98)/THE EURO AREA (SINCE 1999)**


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Chart 5

Percentage points



Note: For Denmark, Danmarks Nationalbank's lending rate has been used for the entire period. For Germany, the Bundesbank's repo rate has been used. For the euro area, for the period from 1999 to 27 June 2000 the ECB's fixed allotment rate in the main refinancing operations has been used. After this time, the ECB's minimum bid rate has been used until 14 October 2008, followed by the ECB's fixed allotment rate.

Source: Deutsche Bundesbank, ECB and Danmarks Nationalbank.

INFLATION (HICP) AND OUTPUT GAPS

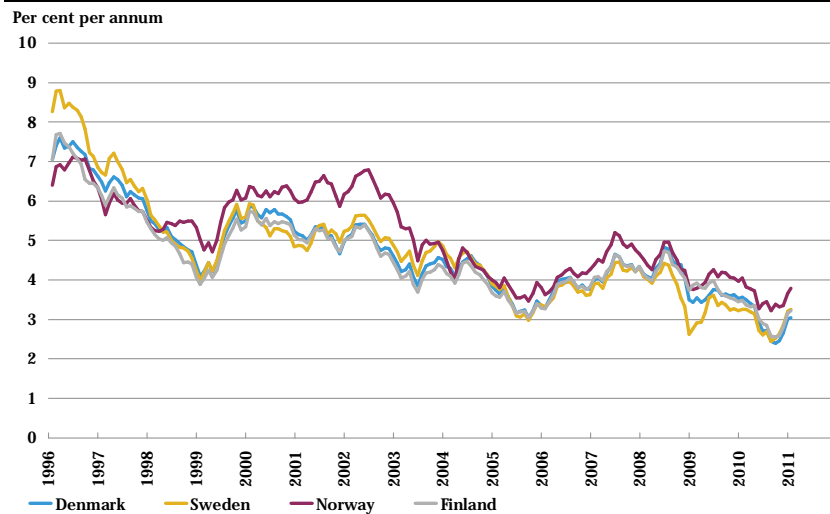
Chart 6



Note: The output gap is a measure of actual GDP less potential GDP as a percentage of potential GDP. Output gaps for 2010 are forecasts.  
Source: Reuters EcoWin and OECD.

YIELDS ON 10-YEAR GOVERNMENT BONDS

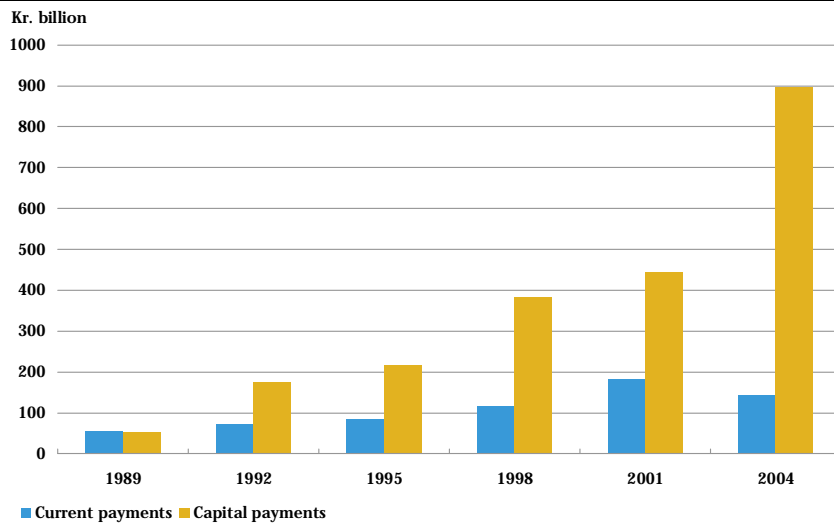
Chart 7



Source: Danmarks Nationalbank.

## REGISTERED GROSS PAYMENTS TO AND FROM DENMARK

Chart 8

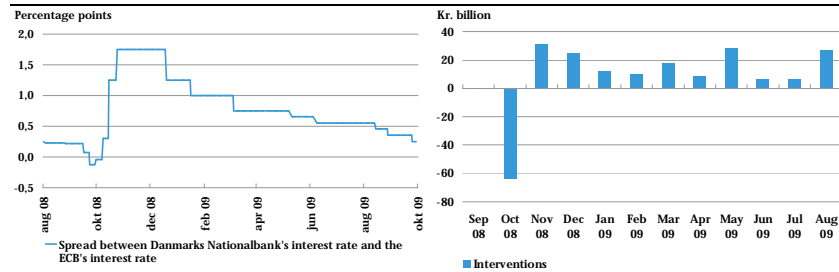


Note: Due to restructuring of the statistics, it is not possible to include years after 2004. Capital payments include derivatives from 2001 onwards. Registered capital payments underestimate the actual volume of capital payments as the statement does not include transactions between residents and non-residents that do not affect the external position of the banking sector (after 1999: of a bank), e.g. purchase of foreign securities by a Danish bank.

Source: Danmarks Nationalbank.

## INTEREST-RATE SPREAD AND INTERVENTIONS

Chart 9



Note: Left: The ECB's interest rate is the variable allotment rate (the marginal rate on the ECB's main refinancing operations) until 14 October 2008, after which time the fixed allotment rate has been used. Right: Danmarks Nationalbank's net purchases of foreign exchange for intervention purposes, calculated on settlement days.

Source: Danmarks Nationalbank and ECB.

INTERVENTION IN THE FOREIGN-EXCHANGE MARKET FOR DANISH  
KRONER

Table 1

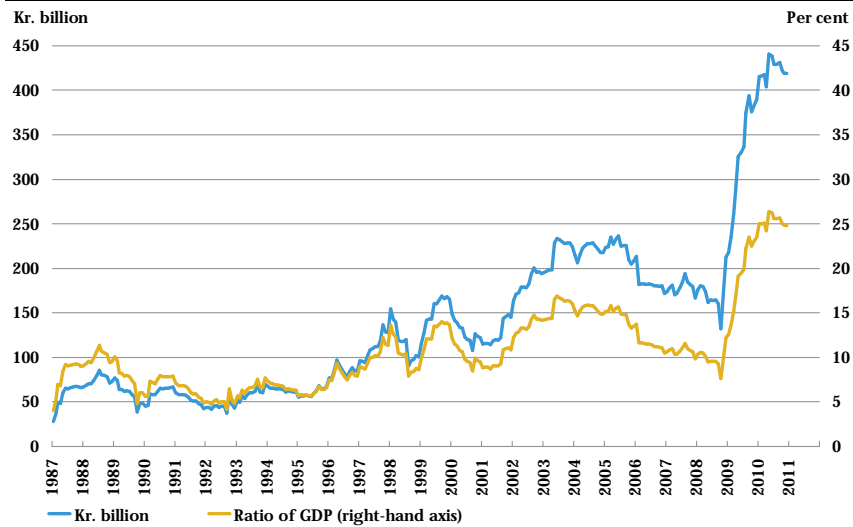
	Purchase of foreign exchange	Sale of foreign exchange	Net purchase of foreign exchange	Number of interven- tion days
	Kr. billion			
1990 .....	30	1	29	84
1991 .....	1	3	-2	19
1992 .....	23	39	-16	33
1993 .....	54	84	-31	73
1994 .....	11	0	11	21
1995 .....	37	5	32	84
1996 .....	46	22	23	96
1997 .....	40	6	34	63
1998 .....	42	71	-30	86
1999 .....	62	5	56	65
2000 .....	21	58	-37	55
2001 .....	27	4	24	11
2002 .....	41	0	41	35
2003 .....	25	1	24	20
2004 .....	15	28	-12	34
2005 .....	16	34	-18	35
2006 .....	0	34	-34	13
2007 .....	17	19	-2	17
2008 .....	66	86	-20	48
2009 .....	154	0	154	46
2010 .....	64	18	46	22

Note: Interventions have been accrued according to the value date, except for interventions in the forward foreign-exchange market in 1990-91, which have been included at the trade date. Some of the large interventions in support of the krone during the currency unrest in 1992-93 were made by other ERM central banks, not by Danmarks Nationalbank. Such intervention is also included in the table. From August 1993 all interventions were performed by Danmarks Nationalbank.

Source: Danmarks Nationalbank.

DANMARKS NATIONALBANK'S FOREIGN-EXCHANGE RESERVE

Chart 10

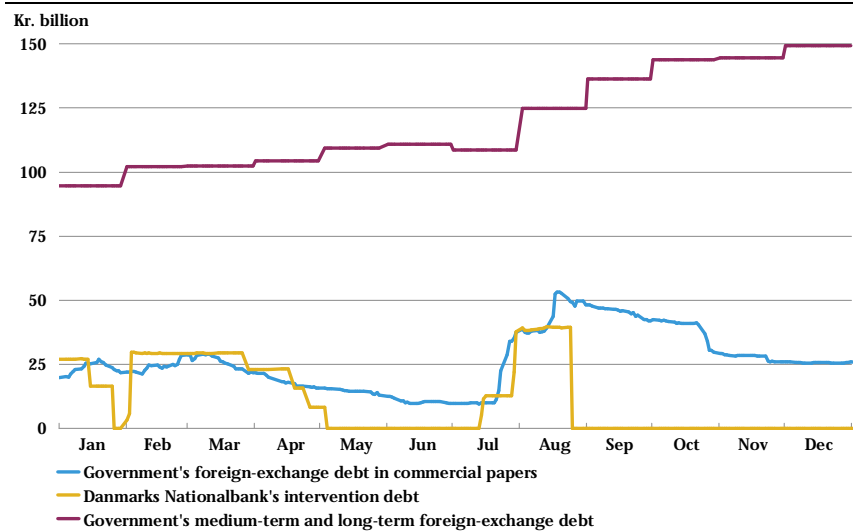


Note: Net assets, end of month.

Source: Danmarks Nationalbank.

DANMARKS NATIONALBANK'S INTERVENTION DEBT AND THE DANISH GOVERNMENT'S FOREIGN-EXCHANGE DEBT IN 1993

Chart 11



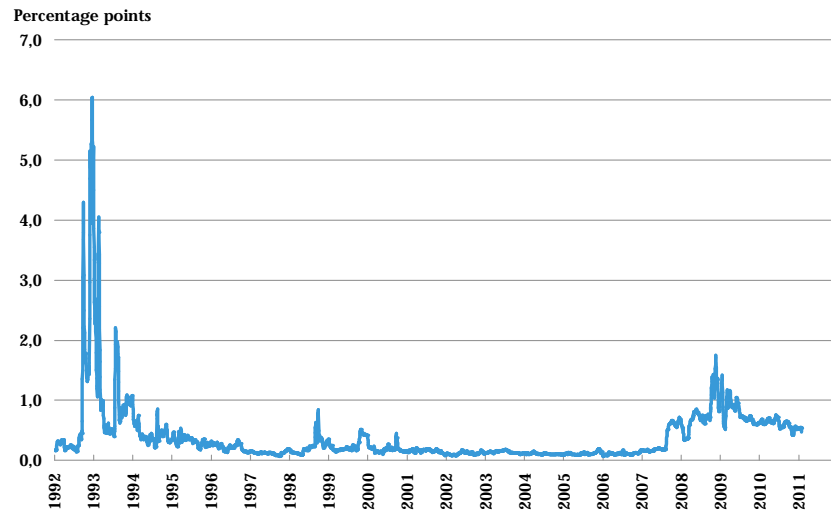
Note: The government's foreign-exchange debt in commercial papers and Danmarks Nationalbank's intervention debt are stated on a daily basis, while the government's medium-term and long-term foreign-exchange debt is stated on a monthly basis.

Source: Danmarks Nationalbank.



SPREAD BETWEEN UNCOLLATERALISED AND COLLATERALISED 3-MONTH MONEY-MARKET INTEREST RATES

Chart 12

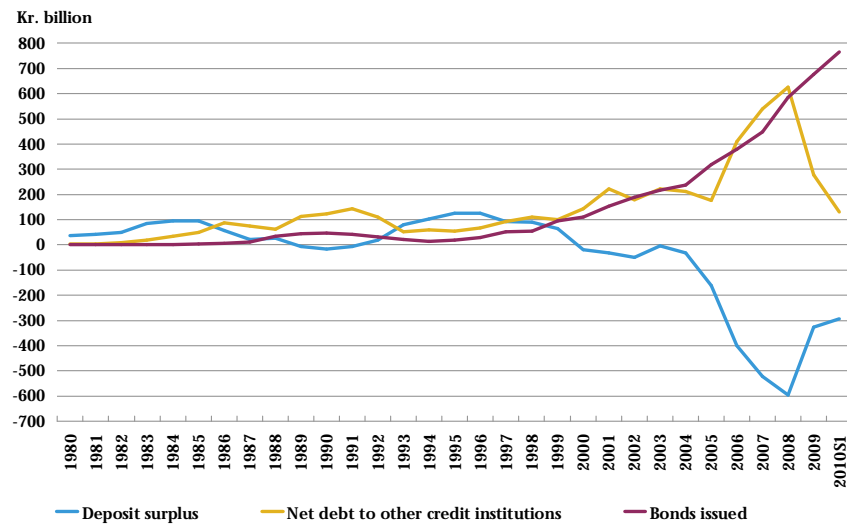


Note: 5-day moving average of daily observations. The collateralised money-market interest rate concerns repos, while the uncollateralised rate is CIBOR.

Source: Danmarks Nationalbank.

THE BANKS' DEPOSIT SURPLUS, NET DEBT TO OTHER CREDIT INSTITUTIONS AND BOND ISSUES

Chart 13



Source: Danish Financial Supervisory Authority.