THE DANISH KRONE UNDER PRESSURE IN JANUARY-FEBRUARY 2015

INTRODUCTION AND SUMMARY

Danmarks Nationalbank has conducted a fixed exchange rate policy since 1982 – first against the D-Mark and from 1999 against the euro.[1] The framework for the fixed exchange rate policy is the European Exchange Rate Mechanism (ERM 2). Officially, the krone may fluctuate by up to 2.25 per cent on either side of the central rate, but in practice Danmarks Nationalbank ensures that the fluctuations are far smaller. The peg is a cornerstone of Danish economic policy and there is widespread support for the fixed exchange rate. Underpinned by stability-oriented fiscal and structural policies, the fixed exchange rate policy is the foundation of stable economic growth with low inflation and high employment, and both interest and inflation rates are currently in line with those of Germany. Moreover, the fixed exchange rate policy has helped to support Danish trade with the euro area member states.[2]

The fixed exchange rate policy implies that monetary policy interest rates are solely used to keep the krone stable against the euro, while other considerations – such as cyclical developments in Denmark – are not taken into account. These considerations are addressed by other economic policies, especially fiscal policy. Key instruments for implementing the fixed exchange rate policy are interventions in the foreign exchange market and adjustment of monetary policy interest rates.

When Schweizerische Nationalbank, SNB, decided to remove the cap on the Swiss franc against the euro on 15 January, massive inflows of foreign exchange to Denmark occured. The announcement by the European Central Bank, ECB, on 22 January of a substantial expansion of its asset purchase programme to include government bonds may have contributed to this inflow, which only began to taper off in the latter half of February.

To prevent the Danish krone from appreciating in response to the massive capital inflow, Danmarks Nationalbank has been purchasing large amounts of foreign exchange against Danish kroner in the market. In January and February, Danmarks Nationalbank's interventions totalled kr. 275 billion, and monetary policy interest rates were gradually reduced to a historic low. The gradual interest rate reductions reflect that it was not possible initially to predict the volume or the duration of the foreign exchange inflows. Therefore, Danmarks Nationalbank continuously assessed the need for market intervention and interest rate reductions. Traditional instruments were supplemented by suspension of issuance of government bonds to further curb the capital inflows.

During previous periods of financial turmoil, the krone tended to depreciate. Only the surge in the demand for kroner during the sovereign debt crisis in a number of euro area member states in

1 Spange and Toftdahl (2014) describe how the fixed exchange rate policy is implemented in practice. For a broader review of Danish monetary policy, see Danmarks Nationalbank (2009). Drejer et al. (2011) analyse the impact of monetary policy on households and firms (2011).

2 See e.g. Christensen and Hansen (2015) for an analysis of the economic benefits of the fixed exchange rate policy. The trade effects have been analysed by the Danish Economic Council (2009).

the autumn of 2011 bears some resemblance to the current situation. If the krone tends to weaken, the interest rate instrument typically plays the key role, while foreign exchange interventions are potentially more significant when capital is flowing into the country. Thus, Danmarks Nationalbank has unlimited scope for intervention in the foreign exchange market to accommodate the demand for Danish kroner. Accordingly, support from the ECB within the ERM 2 framework is not relevant in the current situation.

The decision by the SNB to remove the cap on the Swiss franc prompted some foreign investors to buy kroner in the expectation that Denmark would abandon its fixed exchange rate policy. The massive capital inflow was also, in large measure, driven by domestic investors, including insurance companies and pension funds, ICPFs, looking to hedge their euro positions. Due to the fixed exchange rate policy, the euro positions of domestic investors are hedged to a very limited extent only, but after the SNB's decision they have been looking to hedge against potentially large losses in case of krone appreciation.

While the SNB's cap on the Swiss franc was initially conceived as a temporary measure, Denmark's fixed exchange rate policy has been an integral part of economic policy for decades and enjoys broad support across the political spectrum. Danmarks Nationalbank implements the fixed exchange rate policy and has the instruments required to ensure that the krone stays close to its central rate against the euro. At the current level of interest rates, Danmarks Nationalbank records a positive return on its foreign exchange reserve.

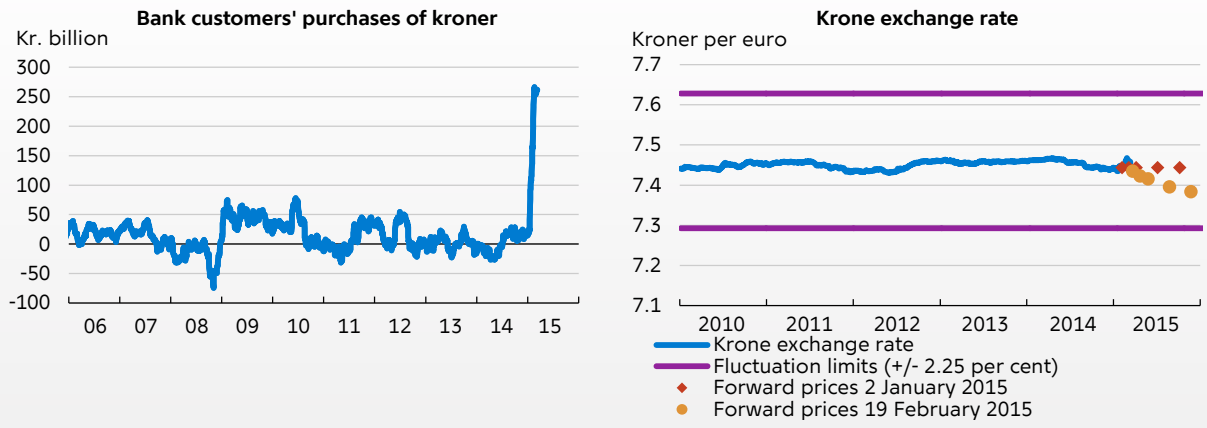
STRONG DEMAND FOR KRONER

The recent considerable inflow of capital to Denmark followed in the wake of the SNB's announcement on 15 January to remove the cap on the strength of the Swiss franc against the euro. After this announcement, the value of the Swiss franc soared. On 22 January, the ECB announced a substantial expansion of its asset purchase programme to include government bonds, which may have contributed to spurring the inflow.

The krone strengthened against the euro, reflecting an increased inflow of foreign exchange, already on the afternoon of the SNB's announcement on 15 January, cf. Chart 1. The krone was subsequently stable at a level slightly stronger than the central rate. Towards the end of February, the krone fell back to a level closer to the central rate as the inflow of foreign exchange halted.

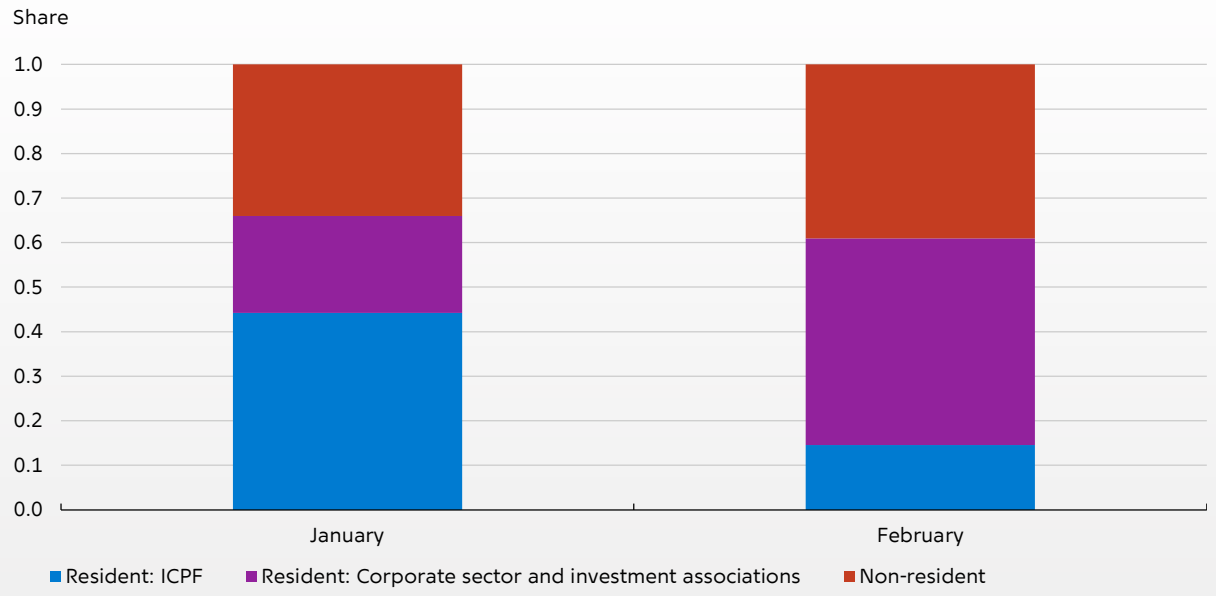
The substantial demand for kroner came from several sources. In January and February, foreign investors accounted for just over one-third of total net purchases of Danish kroner, cf. Chart 2. Demand is reflected both in their forward contracts

Bank customers' purchases of kroner and the exchange rate of the krone against the euro Chart 1



Note: Left-hand chart: Bank customers' current net purchases of kroner as 3-month sums, based on daily data. Bank customers include resident non-banks and non-resident banks and non-banks. The most recent observations are from 10 March 2015.
Source: Danmarks Nationalbank and Thomson Reuters Eikon.

Krone purchases, broken down by banks' customer segments Chart 2



Note: Figures are based on reports from the seven most active banks in the foreign exchange market for kroner. 'Non-resident' covers foreign investors and banks.
Source: Danmarks Nationalbank.

with banks and in their holdings of krone-denominated securities. The Swiss decision to remove the cap on the Swiss franc may have prompted some foreign investors to purchase Danish kroner in the expectation of a gain if Denmark were to abandon its fixed exchange rate policy, with subsequent appreciation of the krone. The foreign investors contribute to an upward pressure on the krone and thus expectations of appreciation of the krone could become self-reinforcing.

In January and February, domestic investors and firms accounted for just under two-thirds of the inflow of foreign exchange. A considerable portion of the demand for Danish kroner in January reflects ICPF's increased hedging of the exchange rate risk by forward purchases of Danish kroner. In February, other domestic actors, especially investment associations, boosted demand for Danish kroner. Domestic purchases in both January and February can be attributed primarily to hedging of exchange rate risks in euro assets and, to a lesser extent, other currencies.

DANMARKS NATIONALBANK'S RESPONSE

In the days following the SNB announcement, Danmarks Nationalbank intervened in the foreign exchange market to stabilise the krone. With effect from 20 January, Danmarks Nationalbank reduced the lending rate and the rate of interest on certificates of deposit by 0.15 percentage point after purchasing foreign exchange against sale of kroner. Later that same week, Danmarks Nationalbank reduced the rate of interest on certificates of deposit by a further 0.15 percentage point, with effect from 23 January, following the ECB's announcement of a substantial expansion of its asset purchase programme.

In the subsequent period, the massive capital inflow to Denmark continued, resulting in foreign exchange purchases by Danmarks Nationalbank totalling kr. 275 billion in January and February. Against that backdrop, Danmarks Nationalbank reduced the rate of interest on certificates of deposit by 0.15 percentage point, to -0.50 per cent, effective 30 January, and finally the rate of interest on certificates of deposit was reduced by 0.25 percentage point, to -0.75 per cent, effective 6

Danmarks Nationalbank's monetary policy interest rates Table 1

	Rate of interest on certificates of deposit	Lending rate	Current account rate	Discount rate
End of 2014	-0.05	0.20	0.00	0.00
With effect from:				
20 January 2015	-0.20	0.05	0.00	0.00
23 January 2015	-0.35	0.05	0.00	0.00
30 January 2015	-0.50	0.05	0.00	0.00
6 February 2015	-0.75	0.05	0.00	0.00

Source: Danmarks Nationalbank.

February. This is a record low for the interest rate on certificates of deposit. The gradual interest rate reductions reflect that it was not possible initially to predict the volume or the duration of the foreign exchange inflows. Therefore, Danmarks Nationalbank regularly assessed the need for market intervention and interest rate reductions.

Monetary policy interest rate cuts primarily affect short-term market interest rates. To curb the continued capital inflow to Denmark, and thus the upward pressure on the krone, long-term interest rates had to come down too. Consequently, the Danish Ministry of Finance, at the recommendation of Danmarks Nationalbank, decided to suspend issuance of Danish government bonds from 30 January. This suspension was enabled in particular by a high government surplus in 2014, entailing that sales of government bonds exceeded the financing requirement. At end-2014, the balance on the central government's account was kr. 213 billion, which is assessed to be considerably higher than necessary.

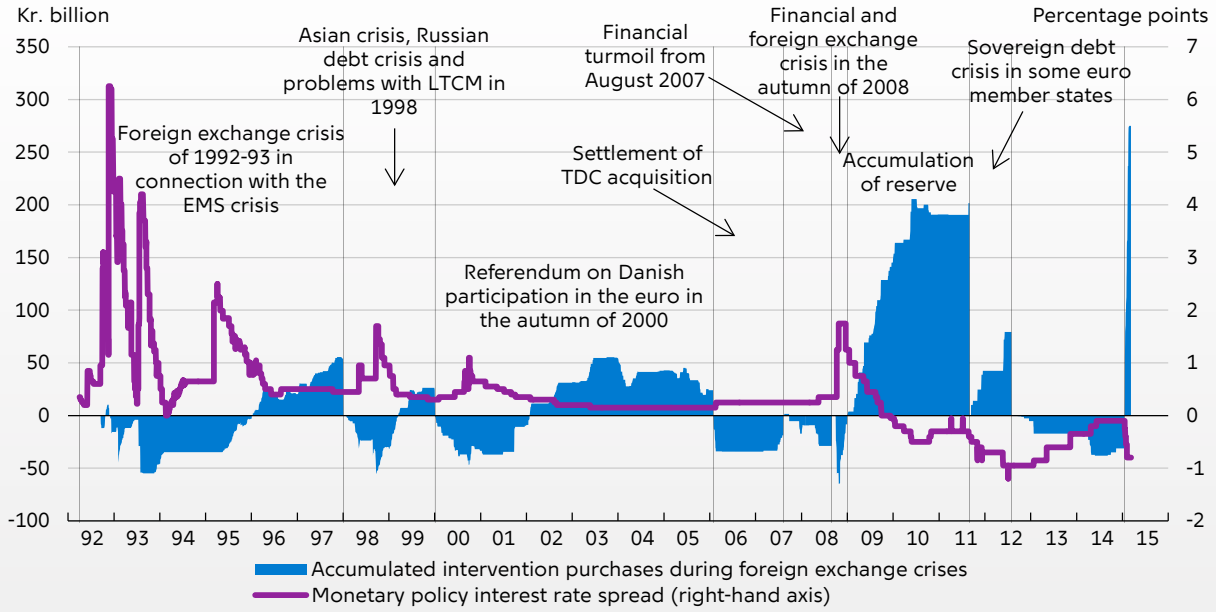
Asset purchase programmes, for instance in the euro area, increase the demand for government bonds, while suspension of issuances reduces the supply. In either case, the effect is downward pressure on bond yields. Total bond purchases under the ECB's asset purchase programmes are planned to total 60 billion euro per month until and including September 2016, or a total of 1,140 billion euro. This is equivalent to approximately 12 per cent of the euro area GDP. Applied to a Danish context, this would be equivalent to an asset purchase programme of about kr. 220 billion. The reduction in the supply of Danish government bonds is equivalent to approximately one-third of this amount if the suspension of issuance remains in effect for the rest of the year.

HEAVY RELIANCE ON INTERVENTIONS

Overall, Danmarks Nationalbank's volume of intervention has been historically high, cf. Chart 3. In January, interventions totalled kr. 106 billion, while interventions in February amounted to kr. 169 billion. By way of comparison, Danmarks Nationalbank purchased foreign exchange against sale of kroner for about kr. 91 billion during the period from July 2011 to July 2012, at the height of the sovereign debt crisis in a number of euro area member states. Conversely, Danmarks Nationalbank sold foreign exchange against purchase of kroner for a total of kr. 64 billion in September and October 2008 after the collapse of Lehman Brothers and the escalation of the financial crisis. So the volume of intervention during the first two months of 2015 substantially exceeded earlier periods of pressure against the krone.

In the most recent period, with a strong tendency towards appreciation of the krone and very low monetary policy interest rates, Danmarks Nationalbank chose to intervene for greater amounts than previously before adjusting interest rates. This was particularly true of the period after the most recent interest rate reduction, effective from 6 February, when the krone was kept stable solely through intervention in the foreign exchange market.

Development of reserves during various periods since 1992 Chart 3



Note: The interest rate spread is the spread between Danmarks Nationalbank's rate of interest on certificates of deposit and the ECB's MRO rate. The most recent observations are from 10 March 2015.
Source: Danmarks Nationalbank.

Greater reliance on intervention rather than interest rate adjustments, compared with previous periods of pressure against the krone, should be seen in the context of larger capital flows than previously seen, among other factors. Moreover, in a situation of upward pressure on the krone, Danmarks Nationalbank may sell unlimited amounts of kroner. At the same time, there is no upper cap on interest rates in a situation of capital outflows, while there is not unlimited scope for lowering interest rates in case of capital inflows.

In the current situation, the scope for unlimited intervention entails that support from the ECB within the ERM 2 framework is not relevant. Traditionally, membership of ERM 2 has provided Denmark with an additional safety net in situations of pressure against the krone. Looking ahead, there is reason to believe that periods of turbulence on the foreign exchange markets more often than before will be reflected in upward pressure on the krone. The reason is that in recent years Denmark has transitioned from being a debtor nation to being a creditor nation with substantial net foreign assets.

Due to the very low level of Danish interest rates, Danmarks Nationalbank records a positive return on the increased foreign exchange reserves. The explanation is that euro purchased in foreign exchange interventions are invested at a higher interest rate than the interest rate paid by Danmarks Nationalbank on the banks' krone deposits. This highlights Danmarks Nationalbank's scope for countering upward pressure on the krone.

Through its reaction function, Danmarks Nationalbank seeks to make it costly for investors to speculate against the fixed exchange rate policy. Costs can be divided into interest rate costs and exchange rate costs. Interest rate costs reflect that with an interest rate on certificates of deposits of -0.75 per cent and similarly low money market interest rates, investors stand to receive a lower return on their krone holdings that they receive (pay) on deposits in other currencies. In a situation with a tendency towards appreciation of the krone, exchange rate costs are reflected in that, in its foreign exchange interventions, Danmarks Nationalbank tends to purchase foreign exchange against kroner from market participants at a lower exchange rate than the rate at which the foreign exchange is later resold.

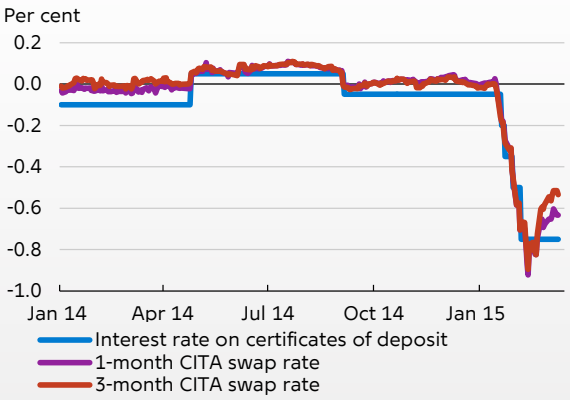
BANKS' FOREIGN EXCHANGE POSITIONS

Danmarks Nationalbank's normal reaction function is well known to the market. In case of upward pressure on the krone, Danmarks Nationalbank's initial response will be to intervene in the foreign exchange market by selling kroner against foreign exchange. If intervention in the foreign exchange market is not sufficient to stabilise the exchange rate of the krone against the euro, Danmarks Nationalbank will lower monetary policy interest rates. This reaction function was manifested by lower short-term money market interest rates than the rate of interest on certificates of deposit already before Danmarks Nationalbank's interest rate changes, indicating that market participants expected interest rates to be reduced.

Danmarks Nationalbank's well-known reaction function entails that, during periods of calm in the foreign exchange market, banks, within certain limits, take foreign exchange positions in the expectation that Danmarks Nationalbank will maintain the exchange rate of the krone within a narrow band around the central rate. This means that in a weak krone scenario, the market will be expecting that the potential for further weakening is smaller than the potential for strengthening, while the opposite will be the case in a strong krone scenario. Banks' willingness to take foreign exchange positions entails that they are able to handle their customers' purchase and sale of kroner against foreign exchange without the intervention of Danmarks Nationalbank.

During the most recent period, Danish banks have not taken foreign exchange positions relative to Danmarks Nationalbank's reaction function to the same extent as previously seen. This typically occurs during periods of pressure against the krone when Danish banks choose to close down their own positions. Consequently, the extent of the pass-through of bank customers' foreign exchange transactions to the exchange rate will be higher, necessitating intervention by Danmarks Nationalbank.

Danish money market interest rates Chart 4



Note: The most recent observations are from 10 March 2015.
Source: Danmarks Nationalbank and Nordea Analytics.

IMPACT ON THE MARKETS

Throughout the period with pressure against the krone, Danmarks Nationalbank's monetary policy interest rates were clearly transmitted to money market interest rates, e.g. with the CITA swap rate closely tracking the interest rate on certificates of deposits, cf. Chart 4. Moreover, in connection with Danmarks Nationalbank's interest rate reductions, the spread between short-term money market interest rates in Denmark and the euro area has mirrored the monetary policy spread in the usual manner. However, the spread between short-term money market rates tended to decline already before the interest rate cuts, reflecting market expectations of Danmarks Nationalbank's response[3].

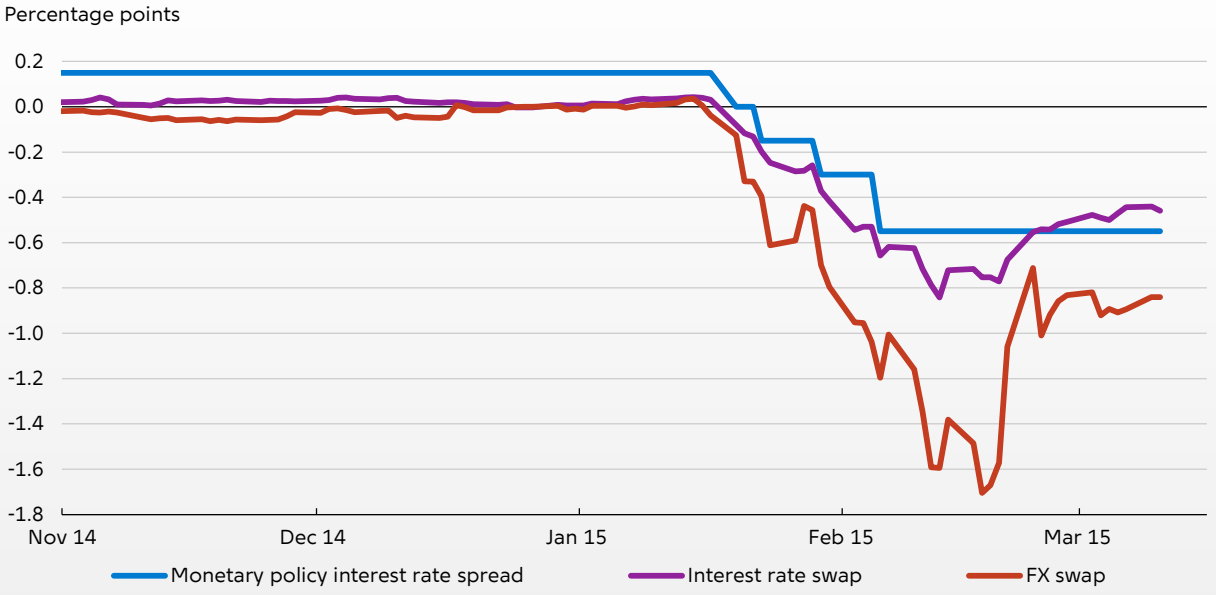
The upward pressure on the krone, and the resulting widening of the interest rate spread to the euro area, caused the exchange rate on forward purchases of euro against kroner to drop sharply. As a result, it became more expensive to purchase kroner at a future date. Thus, the cost of hedging against appreciation of the krone against euro in this manner increased. This means that the lower forward rate makes it more expensive for investors to hedge against, or position themselves for, appreciation of the krone.

With the decrease in the forward rate, the implied interest rate spread from FX swaps has declined considerably more than the monetary policy spread, cf. Chart 5.[4] The lower interest rate

3 The interest rate on interest rate swaps (e.g. CITA swaps and EONIA swaps) may be seen as an indication of expectations of average overnight interest rates over the lifetime of the swap.

4 An FX swap is an agreement comprising a simultaneous spot transaction and forward contract. In connection with the spot transaction, euro is exchanged for kroner at the current spot rate; in connection with the forward contract the amount is exchanged back at a later point in time and at an agreed exchange rate.

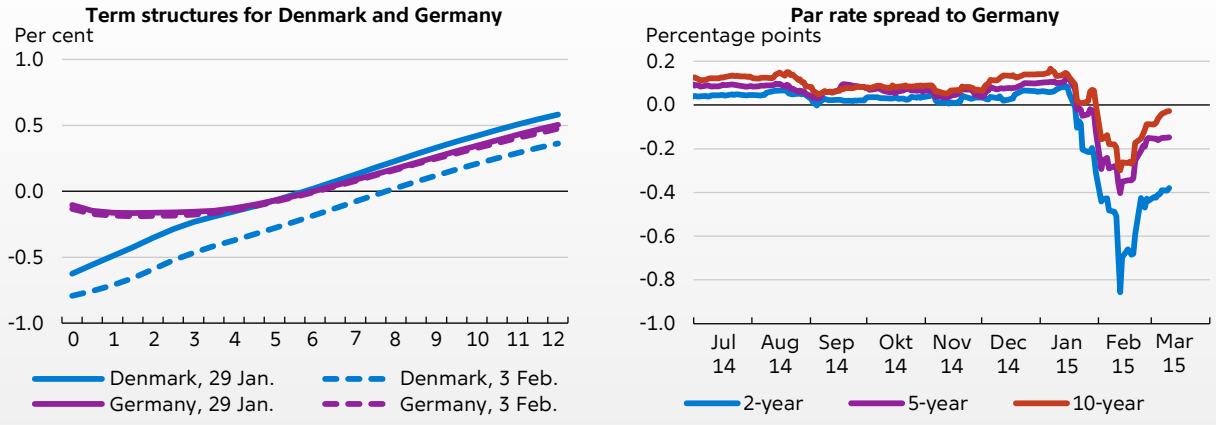
3-month interest rate spread to the euro Chart 5



Note: The monetary policy interest rate spread is the spread between the interest rate on certificates of deposits and the ECB's rate on its deposit facility. Interest rate swap is the spread between the 3-month CITA rate and the 3-month EONIA rate. FX swap is the implied 3-month spread from FX swaps and it expresses the cost of borrowing kroner against euro denominated collateral. The most recent observations are from 10 March 2015.
Source: Danmarks Nationalbank, Nordea Analytics and Thomson Reuters Eikon.

spread from FX swaps reflects the strong demand for forward purchases of kroner against euro. At the same time, the market for forward contracts in kroner is limited by the small number of suppliers, which may also drive the deviation between the implied interest rate spread from FX swaps and other interest rate spreads. Thus, the implied interest rate spread from FX swaps is particularly impacted by situations of upward pressure on the krone.

Government yields Chart 6



Note: The horizontal axis in the left-hand chart is the maturity in years. The most recent observations in the right-hand chart are from 10 March 2015.
Source: Nordea Analytics.

Yields on Danish government bonds fell sharply after the announcement of the suspension of issuance on 30 January, cf. Chart 6. Before that, yields had already declined slightly – especially at the short end of the curve. This should be viewed against the background of market expectations that the level of Danish interest rates would rise again relatively quickly. The falls were related to the development in the Swiss franc, the ECB's announced expansion of its asset purchase programme and Danmarks Nationalbank's interest rate reductions.

Despite the three unilateral Danish interest rate reductions, the yield spread between long-term Danish and German government bonds was marginally positive until the announcement of the suspension of issuance. Following the announcement, the spread declined for all maturities. From mid-February, when the foreign exchange inflow eased, Danish government bond yields increased. In early March, the spread between 10-year Danish and German yields was around 0 percentage point.

THE INTERACTION BETWEEN INVESTORS AND BANKS

Domestic investors, including ICPF, can use the forward market to hedge exchange rate risks. This enables them e.g. to keep existing euro assets and hedge the exchange rate risk by forward purchases of kroner rather than selling their holdings of euro assets to purchase krone assets. This is illustrated in Box 1.

The implied interest rate spread from FX swaps represents a cost to domestic investors when hedging the exchange rate risk by forward purchases of kroner. The cost is reflected in the forward rate being lower than the spot rate. As a result, investors will receive fewer kroner for their euro at the future point in time. This cost should be weighed against their assessment of the risk of appreciation of the krone. That way, the cost could be seen as an insurance premium against substantial appreciation of the krone.

Domestic investors typically enter into forward contracts with their banks. If it is assumed that the bank does not wish to undertake increased risk, it will hedge the foreign exchange and interest rate risks involved in the forward contract. The bank can do so by selling euro spot sales against kroner. That way, the bank already holds the kroner to be received by the domestic investor when the forward contract expires. The bank's spot hedging illustrates why domestic investors' hedging of their exchange rate risk through the forward market has a direct impact on the exchange rate of the krone.

The bank may hedge the interest rate risk by borrowing the euro amount and lending the krone amount for a period of time equal to the maturity of the forward contract. If the interest

Examples of hedging of exchange rate risk by entering into forward contracts

Box 1
continues

The example below illustrates how a pension fund may hedge its exchange rate risk by entering into a forward contract and how a bank may hedge the transaction with the pension fund.

The following assumptions are used in the example[1]:
EUR/DKK spot rate: 7.4440
EUR/DKK 3-month forward rate: 7.4100
Annual interest rate on loans in euro for 3 months: -0.20 per cent.
Annual interest rate on lending of kroner for 3 months: -0.75 per cent.

The pension fund's hedging of foreign exchange risk:
The pension fund is assumed to have a portfolio of euro assets. When acquiring the euro assets, the pension fund purchased euro against sale of kroner and is therefore directly exposed to changes in the exchange rate between euro and kroner. If the krone appreciates relative to the euro, the pension fund will receive relatively fewer kroner when selling the euro asset and subsequently exchanging the revenue from euro to kroner. Since Danmarks Nationalbank keeps the krone within a narrow band against the euro, domestic investors widely choose not to hedge the exchange rate risk against the euro.

If uncertainty is perceived among some investors as to whether the krone will appreciate substantially, the pension fund may wish to hedge part of its exchange rate risk against the euro. This may be effected by purchasing kroner against selling euro at a future point in time through entry into a forward contract. This enables the pension to purchase kroner and sell euro at a specified exchange rate independently of the actual development of the krone exchange rate.

1. Figures are based on interest rates and exchange rates from Thursday, 19 February. However, the figures do not necessarily reflect the exchange rates and interest rates at which resident investors and banks, respectively, were able to trade on the day in question.

Continued Box 1

The pension fund's cost of hedging the exchange rate risk

	Per cent p.a.
Hedging using a 3-month forward contract	-1.83

The bank's hedging of risk by entering into a forward contract with the pension fund:
The pension fund typically enters into the forward contract with a bank. If it is assumed that the bank does not wish to undertake increased risk, it will hedge the exchange rate and interest rate risks involved in the forward contract. The bank hedges its exchange rate risk by selling euro spot against kroner. That way, the bank already holds the kroner to be received by the pension fund when the forward contract expires

The bank may hedge the interest rate risk by borrowing the euro amount and lending the krone amount for a period of time equal to the maturity of the forward contract.

The bank's gain from entering into a forward contract with the pension fund

	Per cent p.a.
Forward transaction, spread between the spot rate and the 3-month forward rate	1.83
Interest rate on loans in euro for 3 months	0.20
Interest rate on lending of kroner for 3 months	-0.75
Total	1.28

1. Figures are based on interest rates and exchange rates from Thursday, 19 February. However, the figures do not necessarily reflect the exchange rates and interest rates at which resident investors and banks, respectively, were able to trade on the day in question.

rate spread between the bank's krone lending and its euro loan is lower than the implied interest rate spread from FX swaps, the bank will record a gain on the forward contract. In the most recent period with upward pressure on the krone, the implied interest rate spread from FX swaps has been lower than the corresponding interest rate spread, cf. Chart 5.

Thus, although they earn a negative rate of interest on krone deposits with Danmarks Nationalbank, banks have a potential gain from entering into and hedging forward contracts. This helps to illustrate banks' opportunities to cover, in full or in part, the direct losses on their krone deposits with Danmarks Nationalbank at a negative rate of interest.

To some extent, banks may pass on the interest rate they receive on deposits at Danmarks Nationalbank to their customers. However, Danish banks have refrained from passing on negative interest rates to retail depositors, but interest rates on large corporate deposits – which earn interest on terms similar to money market terms – are often negative. If interest rates drop into very negative territory for an extended period, this distinction may come under pressure. Instead, the market may develop a practice of providing access to deposit accounts on retail customer terms. Moreover, cash holdings always earn zero interest. These factors emphasise that a lower bound exists for negative interest rates.

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