

INTEREST RATE PASS-THROUGH AND THE DEMAND FOR CASH AT NEGATIVE INTEREST RATES

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INTRODUCTION AND SUMMARY

Since 6 February, Danmarks Nationalbank's rate of interest on certificates of deposit has been -0.75 per cent. This is an all-time low and Denmark, along with Switzerland, has the world's lowest key monetary policy rates. The interest rate on certificates of deposit was lowered into negative territory to defend the Danish fixed exchange rate policy under which monetary policy rates are set solely to maintain a fixed exchange rate of the krone against the euro. The fixed exchange rate policy has been a cornerstone of Danish economic policy for more than 30 years.

In addition to Denmark and Switzerland, key monetary policy rates are negative in the euro area and Sweden. Until a few years ago, negative interest rates were regarded as a curiosity that was hardly likely to function in practice on a large scale.¹ Consequently, it is relevant to examine whether negative interest rates change the relationship between monetary policy rates and other interest rates in the economy. It is also examined whether negative interest rates have increased the demand for cash.²

We find that negative interest rates have not weakened the pass-through from Danmarks Nationalbank's interest rates to money market rates. The pass-through is key to Danmarks National-

bank's ability to manage the exchange rate of the krone against the euro, which is determined to a large extent by the spread between money market rates in Denmark and the euro area.

While the pass-through to money market rates remains unaffected, there has been a shift in Danmarks Nationalbank's relative use of intervention in the foreign exchange market and changes in monetary policy rates. In a situation of low interest rates and capital inflows, Danmarks Nationalbank may sell unlimited amounts of kroner. However, there is a limit to how much more interest rates can be reduced. That is a key explanatory factor in Danmarks Nationalbank's decision in January and February this year to intervene for a larger amount than in previous episodes before lowering interest rates. The very low level of interest rates in Denmark means that Danmarks Nationalbank profits from the expansion of the foreign exchange reserve, highlighting Danmarks Nationalbank's unlimited scope for countering upward pressure on the krone.

Negative interest rates have not been fully passed through to bank deposit and lending rates to households. However, large deposits from firms and institutional investors are extensively paying negative interest rates. In principle, negative interest rates can be circumvented by holding cash, which always offers a nominal return of zero. The reason why interest rates can, nonetheless, be negative is that holding large amounts of cash entails substantial costs, including costs for secure storage and transport. Furthermore, it is cumber-

1 See e.g. Blomquist et al. (2011), discussing alternative monetary policy strategies for interest rates at their lower bound.

2 Monetary policy at negative interest rates in a Danish context was previously discussed by Jørgensen and Risbjerg (2012). See also McAndrews (2015) for a critical review of issues concerning negative interest rates.

some and expensive to use cash for transactions involving large amounts or large geographical distances.

There are no indications that banknotes and coins (currency) in circulation are affected by negative interest rates to any significant degree. This indicates that the lower bound on monetary policy rates in Denmark is lower than the current interest rate on certificates of deposit of -0.75 per cent. However, the bound may shift if economic agents expect the period of negative interest rates to persist. If Danish banks were to begin settling accounts in cash to a great extent, this could weaken Danmarks Nationalbank's ability to influence the krone exchange rate. On the other hand, increased household demand for cash would primarily be a problem of social efficiency due to the trouble of settling transactions in cash.

Negative interest rates are associated with risks that are not directly related to the demand for cash. As a case in point, negative interest rates may cause investors to gravitate towards riskier assets in search of positive returns. This may lead to housing bubbles and financial asset bubbles, for instance bubbles in equity prices. The combination of an upswing in the Danish economy and extraordinarily low interest rates means that the conditions for build-up of systemic risks exist, cf. the Systemic Risk Council (2014). Moreover, viewed in isolation, low interest rates reduce bank earnings.³ Any unwanted effects of negative interest rates must be addressed through other economic policy measures.

PASS-THROUGH OF MONETARY POLICY

Danmarks Nationalbank reduced its monetary policy rates on four occasions in January and February 2015, lowering the rate of interest on certificates of deposit to -0.75 per cent. These reductions were designed to counter the tendency for the krone to appreciate against the euro in response to strong capital inflows to Denmark.⁴ The capital inflows started when the Swiss Nation-

al Bank, SNB, decided to abandon the euro cap on the Swiss franc.

If there is a tendency for the krone to appreciate, Danmarks Nationalbank initially intervenes in the foreign exchange market by purchasing foreign exchange and selling kroner, thereby increasing the supply of kroner. If intervention does not provide sufficient stabilisation of the krone, the next step is to lower monetary policy rates. Both tools were used in January and February to relieve pressure on the krone. Moreover, on 30 January 2015, the Danish Ministry of Finance, on the recommendation of Danmarks Nationalbank, announced that the government would suspend the issuance of government bonds to reduce the supply of krone assets.

The low level of European interest rates is reflected in Danmarks Nationalbank's reaction function in the sense that the weight is on intervention rather than interest rate changes in case of upward pressure on the krone. While Danmarks Nationalbank can sell unlimited amounts of kroner, the possibility of lowering interest rates is more limited. In the current situation, Danmarks Nationalbank's scope for conducting the fixed exchange rate policy is also underpinned by the positive return on the foreign exchange reserve provided by very low Danish interest rates, cf. Danmarks Nationalbank (2015a).

Although negative interest rates are not purely a Danish phenomenon, an interest rate level of -0.75 per cent is very low – in a historical perspective and compared with other countries.

MONEY MARKET RATES

Monetary policy rates initially affect money market rates. It is essential that the pass-through from monetary policy rates to money market rates is intact – especially since the spread between money market rates in Denmark and the euro area determines the exchange rate of the krone against the euro. The pass-through is usually high. There are no indications that the pass-through has weakened in response to negative interest rates, cf. Chart 1.⁵ Short-term money market rates tracked the rate of interest on certificates of de-

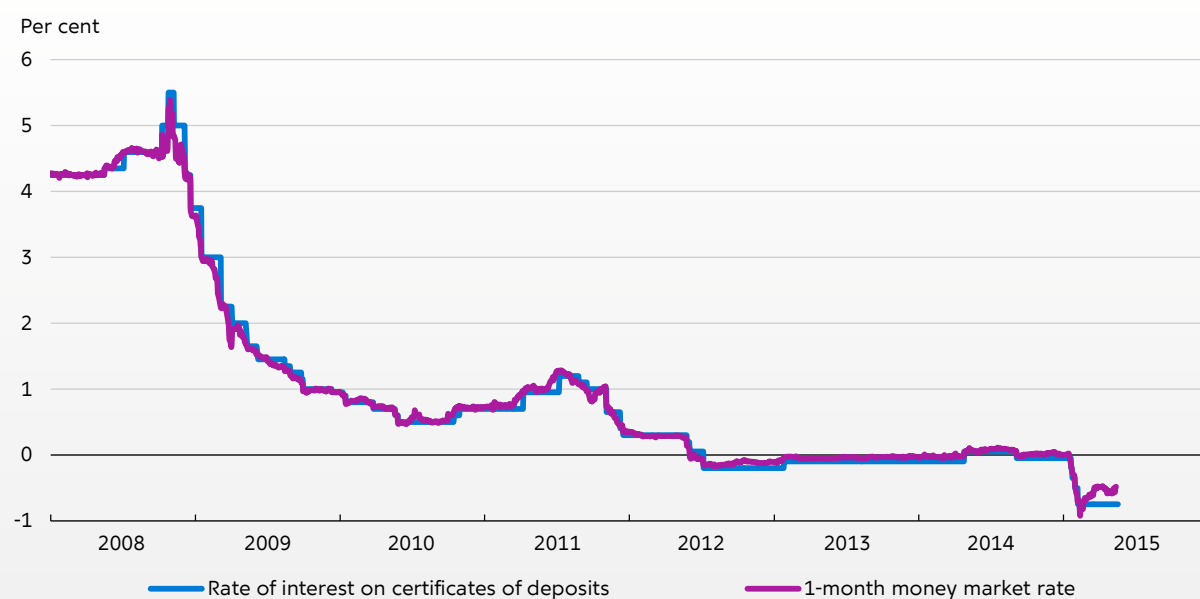
3 See Danmarks Nationalbank (2015b) for an analysis of the effect of negative interest rates on the earnings of credit institutions.

4 See Danmarks Nationalbank (2015a) for an analysis of the pressure on the krone in January-February 2015.

5 See Jørgensen et al. (2011) and Mindested et al. (2013) for analyses of the pass-through from monetary policy rates to money market rates.

Danmarks Nationalbank's rate of interest on certificates of deposit and a short-term money market rate

Chart 1



Anm.: Danmarks Nationalbank's rate of interest on certificates of deposit and lending rate were identical until June 2009. The 1-month money market rate is a T/N swap rate.
 Kilde: Nordea Analytics and Danmarks Nationalbank.

posit closely when the latter rate was lowered in January and February.

In mid-February, money market rates were lower than the rate of interest on certificates of deposit, presumably reflecting investor expectations of yet another interest rate reduction. When this failed to materialise, money market rates picked up again. Since 20 February 2015, short-term money market rates have been higher than the rate of interest on certificates of deposit, indicating, among other things, that investors expect the monetary policy spread to the euro area to narrow.

Limits have been established for the monetary policy counterparties' total current account deposits with Danmarks Nationalbank. In normal times the purpose of these limits is to restrict the liquidity that banks can make readily available for speculation in interest rate and exchange rate movements. When the rate of interest on certificates of deposit is higher than the current account rate, the current account limits generally do not constitute a binding restriction on banks' current account deposits.

However, in a situation like the current one, in which the rate of interest on certificates of deposit is lower than the current account rate, banks have

an incentive to increase their current account deposits to avoid holding certificates of deposit. Accordingly, the role played by current account limits is different. To ensure the pass-through from the rate of interest on certificates of deposit to money market rates in the current situation, it is key that the overall current account limit is binding, as this will induce banks to hold part of their liquidity in certificates of deposit. This is clearly the case, since Danish banks' net position is currently around kr. 310 billion, while their total current account limit is just over kr. 173 billion.

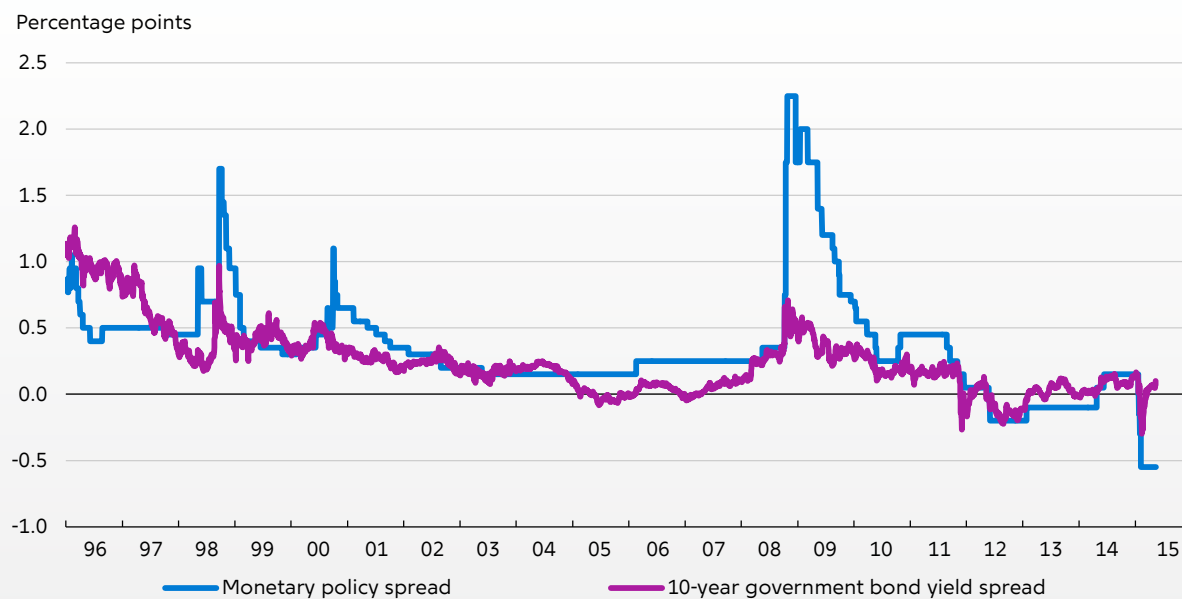
Current account limits were raised on two occasions in March 2015. On the day of the announcement of the first adjustment, money market rates rose moderately. However, the increase was short-lived, and there are no indications that the adjustment of current account limits has had an impact on money market rates. This illustrates that money market rates are determined by the rate of interest on banks' marginal positions with Danmarks Nationalbank, i.e. the rate on certificates of deposit.

BOND YIELDS

The generally low level of interest rates is primarily attributable to the European Central

Interest rate spreads between Denmark and the euro area

Chart 2



Note: The monetary policy spread is given as the spread between Danmarks Nationalbank's rate of interest on certificates of deposit and the ECB's rate. Until 14 October 2008, the ECB's main refinancing rate is used. After this date, the ECB's deposit rate is used. The 10-year government bond yield spread is between Danish and German par yields, i.e. the calculated yield for a maturity of exactly 10 years.

Source: Nordea Analytics, ECB and Danmarks Nationalbank.

Bank's, ECB's, lowering of interest rates to meet its objective of annual consumer price inflation of below but close to 2 per cent. In September 2014, the ECB lowered its deposit rate to -0.2 per cent. Due to the fixed exchange rate policy, there is a close relationship between monetary policy rates in Denmark and the euro area. But the upward pressure on the krone caused Danmarks Nationalbank to reduce interest rates more than the ECB.

Extraordinary deviations between monetary policy rates in Denmark and the euro areas due to pressure on the krone are usually relatively short-lived, cf. Chart 2, reflecting that pressure on the krone eases when market participants realise that Danmarks Nationalbank has the mandate and the means to defend the fixed exchange rate policy. Therefore, the degree of pass-through from unilateral Danish interest rate changes to longer-term government bond yields is limited.

In the autumn of 2011, upward pressure on the krone reflected that investors were buying Danish government bonds, seeking a safe haven from the sovereign debt crisis in a number of euro area member states, cf. Jørgensen et al. (2013). At that time, the response of longer-term yields was

relatively strong compared with the change in monetary policy rates.

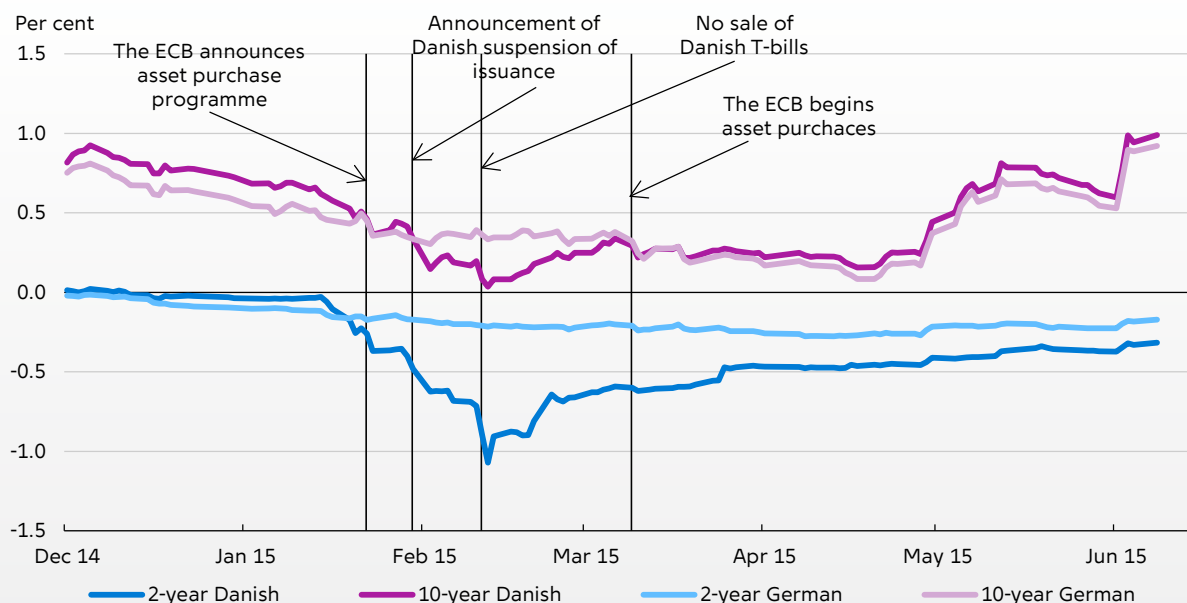
In light of the widening of the spread between monetary policy rates in Denmark and the euro area to -0.55 percentage points, the pass-through to longer-term yields was also more pronounced than normally seen, the main reason being the suspension of issuance of government bonds. The suspension caused yields on Danish government bonds to decline. As pressure on the krone eased, the 10-year yield spread to Germany subsequently widened almost to the level seen before the announcement.

The development in longer-term yield spreads between Danish and German government bonds should also be seen in the context of the ECB's announcement on 22 January 2015 of an expansion of its asset purchase programme to include substantial purchases of government bonds. Market participants had been expecting the expansion for some time, so the impact was, to some extent, already factored into prices. However, yields on European government securities continued to fall after the announcement.

When the ECB began its purchases on 9 March, yields declined slightly in both the euro area and

Danish and German government bond yields

Chart 3



Note: Par yields.
Source: Nordea Analytics, ECB and Danmarks Nationalbank.

Denmark, cf. Chart 3. Hence, there was an indirect pass-through effect from the ECB’s quantitative easing to Danish yields. Moreover, the spread is probably still affected by a lower liquidity premium in Danish bonds following the suspension of issuance.

Both Danish and European yields, especially long-term yields, have risen sharply since mid-April. In the euro area, an upgraded growth outlook and rising inflation expectations probably play a role. At the same time, the increase in bond yields could also be due to redressing after some over-reaction to the decline in yields.

Faced with low bond yields, investors looking for higher returns have to turn to high-risk assets, cf. Danmarks Nationalbank (2015b). In addition to impacting prices of the assets included in the asset purchase programme, quantitative easing may thus also lead to higher prices on other assets. A study finds that previous ECB purchase programmes, the Securities Markets Programme (SMP) and Outright Monetary Transactions (OMT), increased the return on equities.⁶ The Bank of England finds indications that their quantitative

easing had a small, but positive, effect on equity prices in the UK.⁷ Thus quantitative easing may contribute to general increases in equity prices, reflecting low yields. This also applies to Danish equities, which are relatively close substitutes for equities in euro due to the fixed exchange rate policy.

Interest rates on both long-term fixed rate mortgage loans and short-term adjustable rate and variable rate mortgage loans dropped sharply during the initial months of this year. Interest rates on adjustable rate loans with fixed interest periods up to and including three years fell into negative territory in January and February. However, due to administration margins and brokerage fees, the payment flow still goes from borrowers to mortgage banks. Negative interest rates on mortgage loans gave rise to technical and legal considerations, as it had to be ensured, among other things, that the systems of banks, including mortgage banks, were able to handle negative interest rates. These aspects are discussed in Danmarks Nationalbank (2015b).

6 See Krishnamurthy et al. (2014).

7 See Joyce et al. (2011).

RETAIL INTEREST RATES

Generally, the pass-through from Danmarks Nationalbank's interest rates to bank retail interest rates is high and fast to materialise. However, recent developments in retail interest rates indicate that the pass-through has been reduced. This also applies in other European countries and the USA where the pass-through has weakened due to the financial crisis and the sovereign debt crisis, cf. Paries et al. (2014) and Gambacorta et al. (2014).

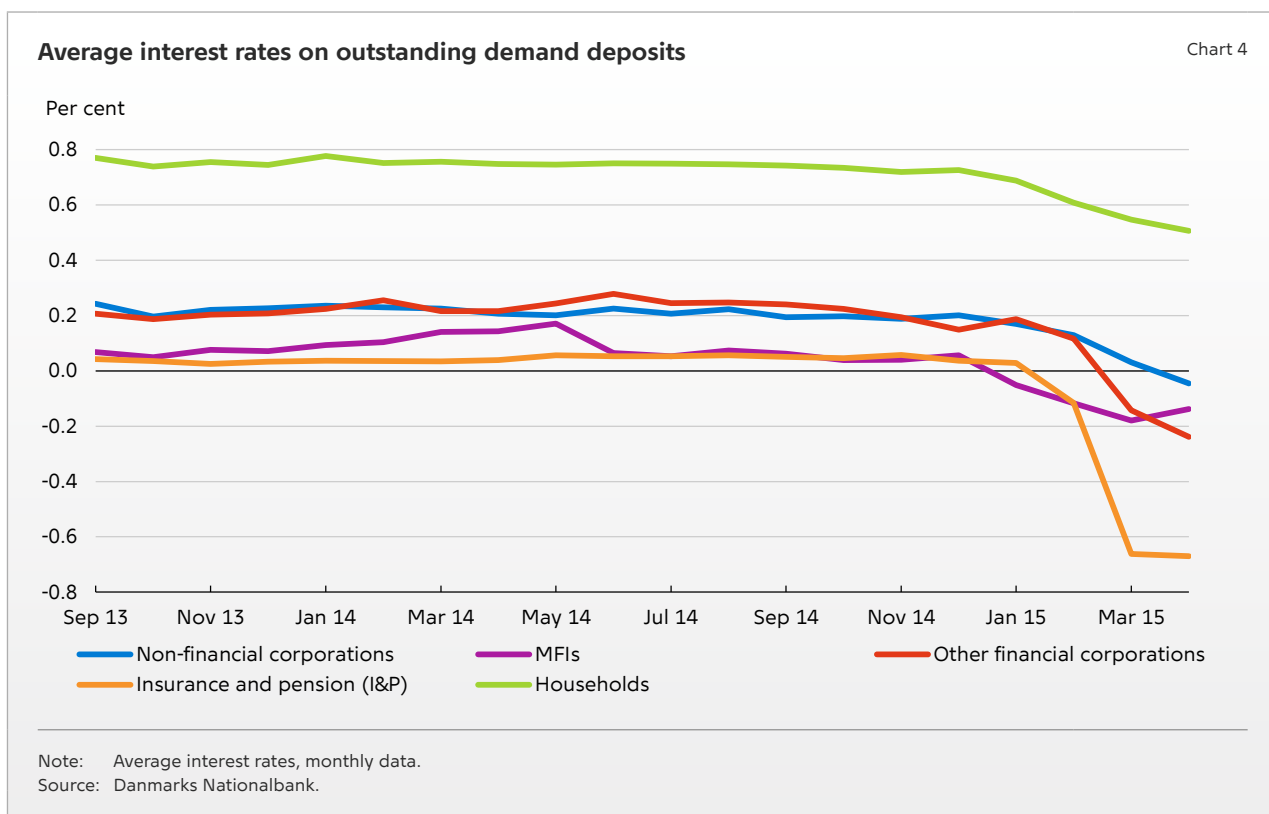
Bank lending rates to households and the corporate sector declined by just under 0.3 percentage points from the turn of the year until the end of April 2015. In the same period, the rate of interest on household demand deposits decreased by 0.2 percentage points, cf. Chart 4. In periods of pressure on the krone, the pass-through of Danmarks Nationalbank's interest rate adjustments to bank retail customers is normally modest.

The rate of interest on most ordinary household salary accounts is zero. However, mortgage-like loans where the proceeds are placed in the borrower's current account mean that the overall average rate of interest on demand deposits is somewhat higher. Adjusted for mortgage-like deposits, the rate of interest on household demand deposits was just under 0.3 per cent in

March 2015. The rate of interest is slightly above zero due to deposit accounts with special conditions such as shareholder accounts.

Banks have not introduced negative interest rates for households, probably reflecting that negative interest rates could induce some households to cash in their bank deposits. Handling large amounts of cash would entail substantial costs for banks, as their facilities are not designed for a large increase in cash holdings. Higher insurance payments would also be required. Moreover, if all banks did not introduce negative interest rates at the same time, customers could be inclined to switch banks.

Banks' rates of interest on corporate demand deposits have declined by 0.3 percentage point since the turn of the year. The rate of interest on corporate deposits moved into slightly negative territory for the first time in April 2015. Large corporate deposits, in particular, on conditions resembling those in the money market accrue interest at a negative rate. Insurance companies and pension funds (the I&P sector), monetary financial institutions (MFIs) and other financial corporations also earn negative interest rates on their average demand deposits. For the I&P sector, the rate was substantially negative in both March and April.



Danmarks Nationalbank has conducted a survey which showed that the proportion of corporate deposits earning a negative rate of interest in April was roughly equivalent to the proportion earning a positive rate. However, the majority of corporate deposits accrued interest at 0 per cent. Most deposits by MFIs and the I&P sector accrued a negative rate of interest, and only a very small proportion earned a positive rate.

The reason why deposits accruing a negative rate of interest are mainly deposits from large firms and institutional investors is that the typical alternative for these customers is to invest in the money market, where interest rates are also negative. Consequently, these customer types will be less inclined to withdraw their bank deposits if faced with negative interest rates. Danish banks are in line with a number of foreign banks where negative interest rates are imposed mainly on deposits above a certain size, and particularly on corporate and institutional customers.⁸

CASH

In principle, the monetary policy counterparties can avoid paying negative interest rates on deposits with Danmarks Nationalbank by holding cash instead of purchasing certificates of deposit. The same rationale applies to other economic agents. If bank customer deposit rates fall into negative territory, customers can convert their deposits to cash. However, conversion to large cash amounts entails substantial costs, including costs for secure storage and transport. Furthermore it is cumbersome to use cash for transactions involving large amounts or over large geographical distances.

If demand for cash were to rise sharply, this could weaken Danmarks Nationalbank's ability to influence the exchange rate of the krone against the euro. In this context, the source of the demand for cash is vital. Increased demand for cash from households and firms would not affect the transmission to the exchange rate. It would,

however, constitute an efficiency loss to society – primarily because settlement in cash rather than electronically, for instance through the Dankort, involves higher costs, especially in the form of time spent. On the other hand, the transmission to the exchange rate would weaken if banks were to choose to settle accounts in cash, that way deactivating money market rates, or if the I&P sector were to hold cash rather than earning negative deposit rates.

Assessing how far into negative territory interest rates can go before the various actors switch from deposits to cash on a major scale is difficult. Currently, there are no indications that negative interest rates have led to abnormal demand for cash. This indicates that the lower bound on monetary policy rates in Denmark is below the current level of the rate of interest on certificates of deposit of -0.75 per cent. In this context, it is important that household deposits have not moved into negative territory.

DEVELOPMENT IN THE CIRCULATION OF CASH

Cash is used for payment and as a store of value. For a number of years, there has been a strong trend towards electronic payments in which bank deposits are transferred from one bank account to another. Hence, the role of cash as a means of payment is decreasing. However, cash still plays a role, especially for small payments, for purchases of second-hand goods among private individuals and in the "black economy".

Most cash is used as a store of value. Instead of placing their savings with banks, some households opt to hold substantial amounts of cash. However, overall bank deposits of households and firms far exceed their cash holdings. Thus, most people find it more convenient to use bank deposits both for payment and as a store of value.

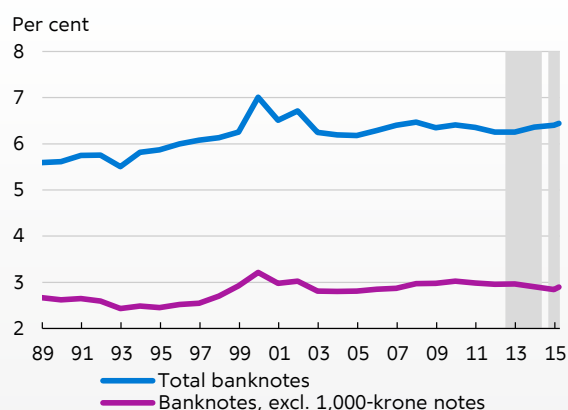
Cash in circulation has seen steady growth over the past 20 years, interrupted only by a brief period of stagnant growth in the immediate aftermath of the financial crisis. From 1992 until the early 2000s, growth in banknotes in circulation exceeded growth in private consumption. Since then, the ratio of banknotes in circulation to private consumption, i.e. the cash ratio, has been more or less constant, cf. Chart 5.

The monetary policy counterparties, all of which are MFIs, receive negative interest rates on their deposits via the negative rate of interest on

⁸ For instance, Commerzbank, Credit Suisse, Deutsche Skatbank, Bank of New York Mellon Corp., Goldman Sachs Group Inc. and J.P. Morgan Chase & Co., cf. Wall Street Journal, Commerzbank to charge fees to discourage large deposits, <http://www.wsj.com/articles/commerzbank-to-charge-fees-to-discourage-large-deposits-1416418127> and Deutsche Skatbank <https://ssl.skatbank.de/content/presse>.

Cash ratio

Chart 5



Note: The cash ratio is defined as the value of banknotes in circulation as a percentage of nominal private consumption. Until and including 2001, data is banknotes in circulation at the end of the year, while an annual average is used for the subsequent period. Data is annual, but the 1st quarter of 2015 is displayed as seasonally adjusted banknotes in circulation as a percentage of seasonally adjusted private consumption for the quarter in question. The grey areas indicate periods of negative rates of interest on certificates of deposit.

Source: Statistics Denmark and Danmarks Nationalbank.

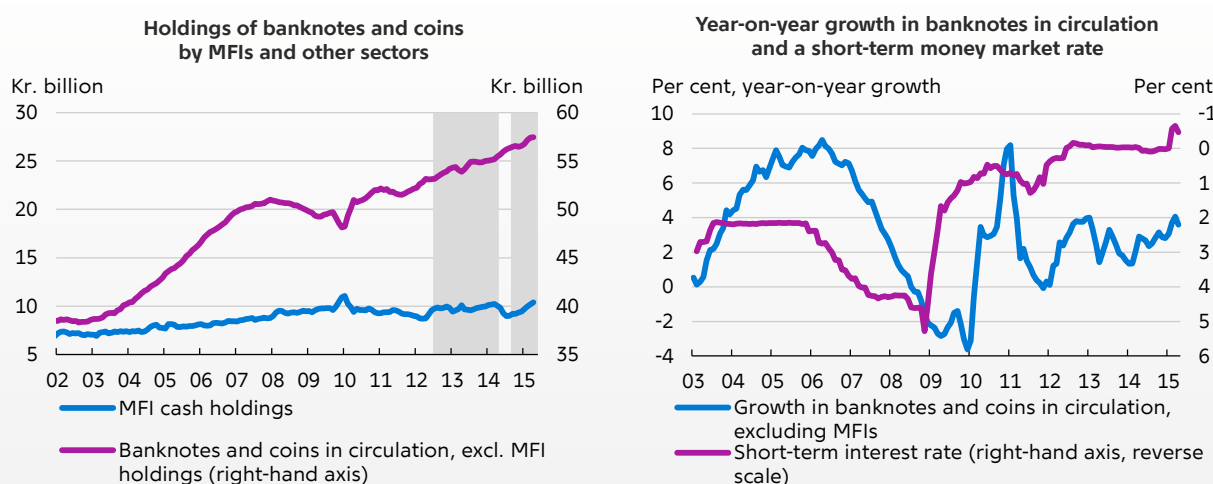
certificates of deposit with Danmarks Nationalbank and the negative money market rates. There has been a slight tendency for MFI cash holdings to increase in periods of negative rates of interest on certificates of deposit, cf. Chart 6 (left). The increase in mid-2012 preceded the actual reduction into negative territory of the rate of interest on certificates of deposit. The explanation may be that the interest rate reduction was expected by market participants, and some money market rates were already negative before the interest rate reduction. From the beginning of January until the end of April 2015, MFI holdings of banknotes and coins rose by 3.5 per cent.

The rise in MFI cash holdings in a negative interest rate environment probably does not reflect that MFIs use cash to avoid negative interest rates, but rather that they increased their holdings to be able to meet a possible pickup in cash demand from other sectors. It should be noted that MFI cash holdings account for less than 1 per cent of the MFIs' total balance sheets and about 15 per cent of total currency in circulation.

The share of currency in circulation held by non-MFIs has been growing steadily since mid-2010. Year-on-year growth in cash in circulation

Cash holdings broken down by sector and growth in cash holdings relative to interest rate movements

Chart 6

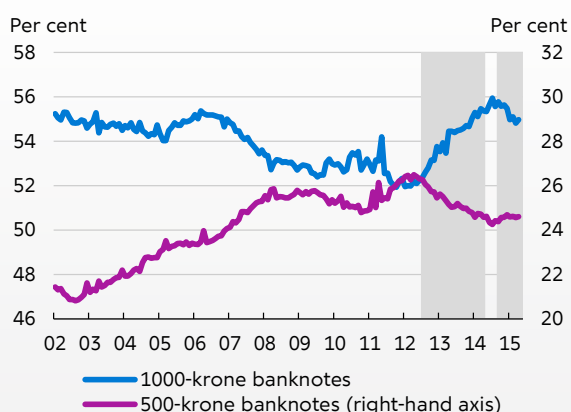


Note: Left-hand chart: Banknotes in circulation include Faroese banknotes, totaling kr. 369 million at end-2014. Data is seasonally adjusted and calculated as 3-month centered moving averages. MFIs increased their cash holdings in late 2009 and early 2010, reflecting the introduction of the new Danish banknote series and a period of overlapping banknote series. The grey areas indicate periods of negative rates of interest on certificates of deposit. The most recent observations are from April 2015. Right-hand chart: The short-term money market rate given by monthly averages of a 1-month OIS rate. Banknotes and coins in circulation are seasonally adjusted and calculated as 3-month moving averages. The most recent observations are from April 2015.

Source: Thomson Reuters Datastream and Danmarks Nationalbank.

Large banknotes as a percentage of banknotes in circulation

Chart 7



Note: Excluding Faroese banknotes and including MFI cash holdings. The grey areas indicate periods of negative rates of interest on certificates of deposit. The most recent observations are from May 2015.

Source: Danmarks Nationalbank.

has risen since early 2014, and growth in the past three months, in which the rate of interest on certificates of deposit has been substantially negative, is no different.

There is normally a connection between growth in banknotes in circulation and the movements in short-term interest rates, reflecting that short-term interest rates represent the opportunity costs of holding cash rather than deposits. Against that backdrop, it is to be expected that the number of banknotes in circulation goes up when interest rates go down, whether they are negative or positive. There are no indications that the increase in circulation seen in recent months has been substantially different from the interest rate reductions when interest rates are positive, cf. Chart 6 (right).

Based on the statistical data available, the cash circulation cannot be broken down further into sectors. Thus, it is not possible to determine whether large corporate customers and institutional bank customers who have been charged negative interest rates on their deposits have increased their cash holdings more than households and small firms that have not been exposed to negative interest rates.

From the introduction of the negative rate of interest on certificates of deposit in July 2012 until July 2014, there was some redistribution of

banknote denominations in circulation, cf. Chart 7. In July 2014, the 1,000-krone banknote accounted for 56 per cent of total banknotes in circulation, up from 52 per cent. This percentage has declined slightly in recent months when the rate of interest on certificates of deposits has been substantially more negative. The increase in the percentage of the 1,000-krone banknote of total banknotes in circulation could reflect that cash has increasingly been used as a store of value. Another explanation is that more ATMs now dispense 1,000-krone banknotes. The higher percentage of 1,000-krone banknotes is at the expense of both 500-krone banknotes and smaller-denomination banknotes.

COSTS OF HOLDING AND USING CASH

The limit for when the demand for cash will increase is determined by the actual costs of holding cash rather than deposits. Moreover, demand is only likely to increase if negative interest rates are expected to persist for some time. The costs of holding cash rather than deposits can be calculated by adding up the costs for secure storage and transport, as well as the trouble of settling payments in cash. The estimate will be subject to great uncertainty.

Danmarks Nationalbank has conducted an analysis of the costs of various types of payment instruments, cf. Danmarks Nationalbank (2011). The analysis shows that the social cost per cash payment is kr. 0.038 per krone paid, while the social cost is just kr. 0.010 per krone paid for Dankort transactions.⁹ Social costs are all costs incurred by the financial sector, retailers and households. For the latter two groups, costs are primarily related to internal procedures, such as cashing up the till and time spent on the various payment methods. Settling cash payments is more expensive for all economic agents, but relatively most expensive for banks.

Schmiedel et al. (2012) have calculated the corresponding social costs in 13 EU member states,

⁹ The calculations reflect the costs of actual transactions in 2009 and thus do not represent the marginal costs of using the various payment instruments. The costs of payment with international debit and credit cards were kr. 0.069 and kr. 0.040, respectively, per krone paid. The higher cost relative to Dankort payments should be seen in light of the fact that payments with international cards are subject to the same fixed costs as Dankort transactions, but the international cards are less prevalent in Denmark, and thus the price per krone of transaction is higher. For transactions exceeding a certain amount, cash payments are expected to be subject to higher marginal costs than card payments.

including Denmark. The costs of cash payments are 2.3 euro cents per euro paid, while the costs of card payments are 1.7 euro cents. The costs vary across countries: countries that are less dependent on cash have higher costs for using cash. Consequently, the cost structure indicates that the lower bound on interest rates is slightly more negative in Denmark than in some other EU member states.

In early 2005, Danish banks and retailers were allowed to pass on part of the costs of Dankort transactions to consumers. As a result, many retailers introduced a Dankort fee of kr. 0.50 per transaction. This caused the number of Dankort transactions to drop sharply in the first few months of 2005, cf. Abildgren et al. (2010). Viewed in isolation, this episode may indicate that the rate of interest on bank deposits marking the turning point for when households begin to withdraw their deposits is only marginally below zero. The reluctance to paying the Dankort fee probably to a great extent reflects dissatisfaction with banks and retailers. The same could apply to negative deposit rates if bank customers perceive them as unfair.

The analyses do not consider the costs of storage of large amounts of cash. Estimated costs relate to small, everyday transactions in which cash is an obvious alternative to electronic payments. Against that backdrop, they probably underestimate the real costs in situations where cash is

used for very large transactions and transactions over large geographical distances. In these situations, costs for transport, storage and insurance will play a major role.

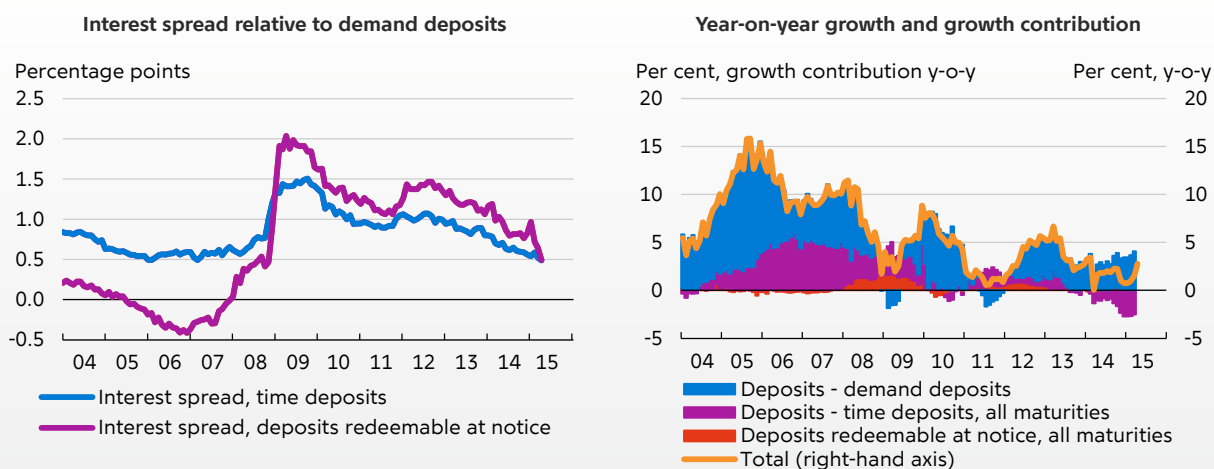
DEPOSITS

The counterpart of an increase in the demand for cash in response to negative interest rates would be a decrease in bank deposits. But negative interest rates may also shift the relationship between the preference for return and liquidity. Therefore, it is relevant to look at developments in deposits across various interest rates and fixed deposit periods. If the rate of return is weighted higher than liquidity, the alternative to a demand deposit paying a negative interest rate could be to tie up the assets for a longer period of time, for instance in a time deposit, a deposit redeemable at notice or in securities.

For households whose deposit rates are generally at zero or higher, there have been no unusual movements in their deposits in recent months. This is in line with the fact that there are no indications of any major change in their cash demand either. However, in a long-term perspective, interest rate changes do have an impact on the composition of household deposits. This is evidenced, for instance, in increasing household preference for demand deposits over time deposits in recent

Household deposit rate and growth broken down by deposit types

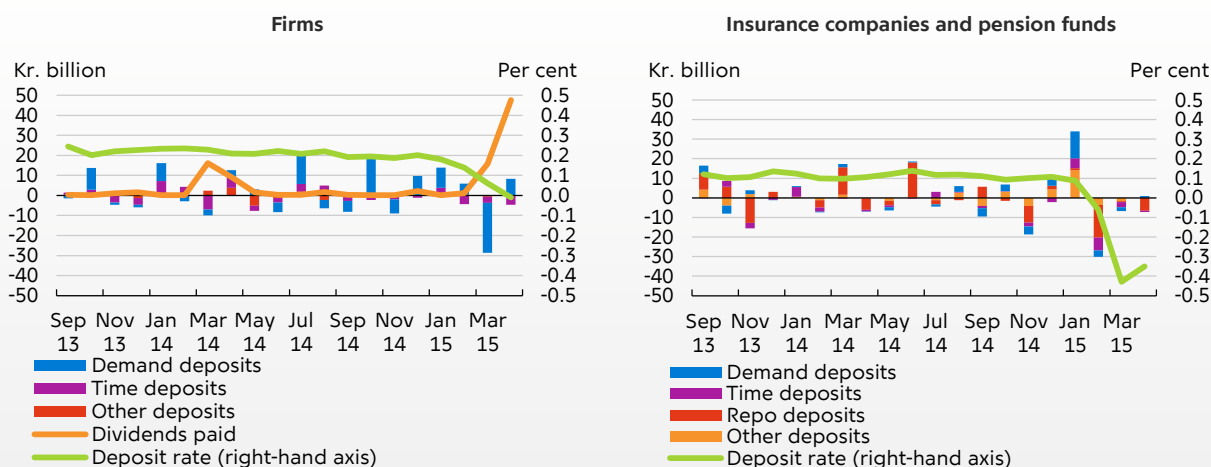
Chart 8



Note: Average rate of interest on outstanding deposits.
Source: Danmarks Nationalbank.

Changes in deposits relative to deposit rate

Chart 9



Note: Average rate of interest on outstanding deposits. Changes in deposits are reported as net transactions.
Source: Danmarks Nationalbank.

years, cf. Chart 8. During the same period, the interest rate differential between deposits with long deposit periods and demand deposits has narrowed.

Following the sharp fall in corporate deposit rates since the turn of the year, developments in corporate deposits have been mixed. In January, February and April, corporate deposits edged up slightly, while March saw a sharp contraction in deposits, totaling just under kr. 30 billion. This fall should probably be seen in the context of substantial corporate dividend payments this year. Total dividend payments in March and April amounted to just over kr. 63 billion, cf. Chart 9 (left).

Developments in corporate deposits would seem to indicate that firms do not withdraw their bank deposits due to lower interest rates. Firms have tended to reallocate assets by reducing demand deposits more than longer-term deposits with higher interest rates. However, isolated observations should be interpreted with caution. Moreover, it is still not possible to provide a full picture of corporate financial assets based on financial statistics.

Deposits earning negative interest rates are primarily large corporate deposits and deposits from institutional investors. This could induce firms preferring to hold assets as bank deposits but looking to avoid negative interest rates to split up deposits into smaller amounts and use multiple

banks. This will not have an impact on the total volume of corporate deposits, but fewer deposits will pay negative interest rates.

The low level of interest rates also provided an incentive for some firms to place liquidity with the Danish tax authorities rather than in banks. In April 2015, this prompted the government to submit a bill for changing the interest rate on the settlement of corporation tax, entailing that it will mirror the rate of interest on certificates of deposit plus a spread of 0.75 per cent (0.2 per cent for early disbursement of tax refunds). The introduction of a cap on the maximum balance of corporate tax accounts was also proposed. With the calling of the general election for the Danish Folketing (parliament) in June, the bill initially lapsed. However, the bill could still be adopted for enactment on the date proposed.

In February, March and April, the I&P sector was earning negative bank deposit rates. In February, I&P deposits contracted by about kr. 30 billion, mainly reflecting a reduction in repo deposits, i.e. loans against financial assets as collateral. This represents a large fall relative to the preceding months, cf. Chart 9 (right).

This movement should be interpreted with caution, but two factors indicate that the reduction should not be attributed to negative interest rates. Firstly, the movement out of deposits in the following months, i.e. March and April, was relatively insignificant, although interest rates

remained negative. Secondly, there had been a substantial increase in deposits in the preceding month, i.e. January.

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