

DANMARKS
NATIONALBANK

Negative interest rates and the implications for households, firms and banks

Thomas Harr, Assistant Governor, Danmarks Nationalbank,
7 October 2021

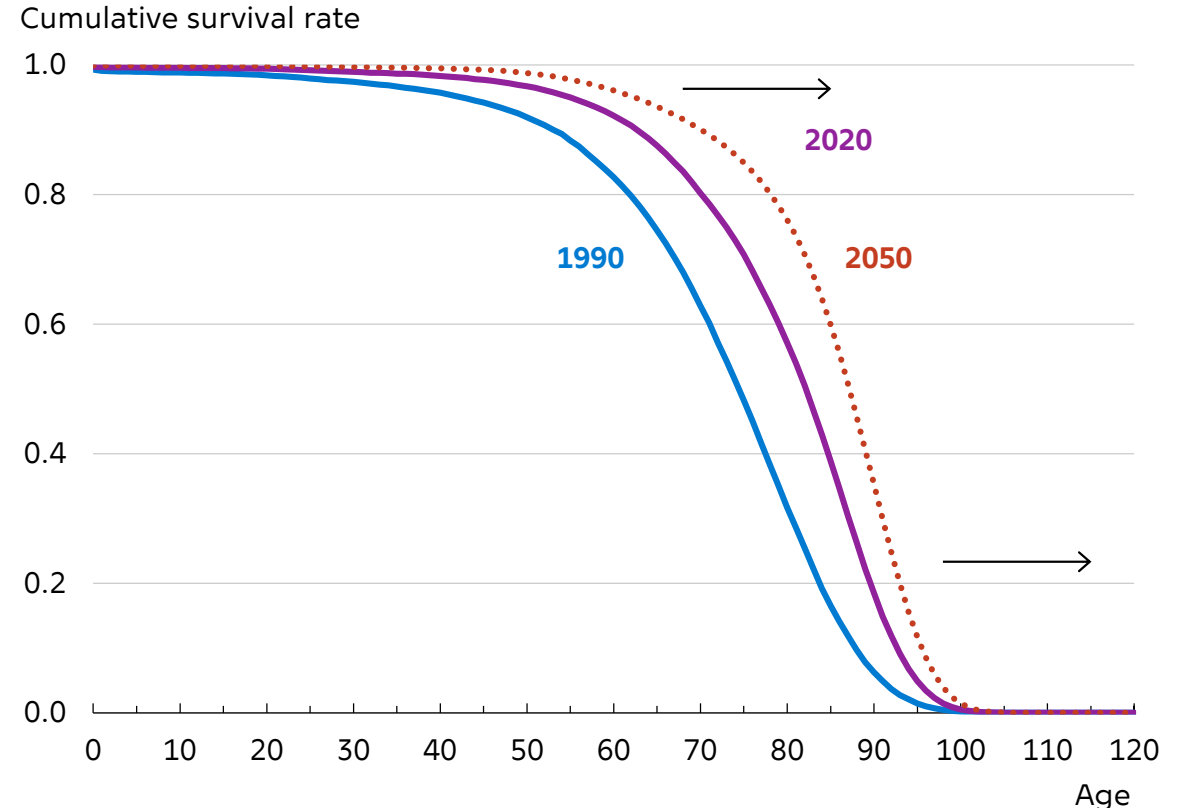
In the long run, real interest rates are determined by r^*

r^* has fallen in Denmark since the 1990s



Source: Pedersen (2015).

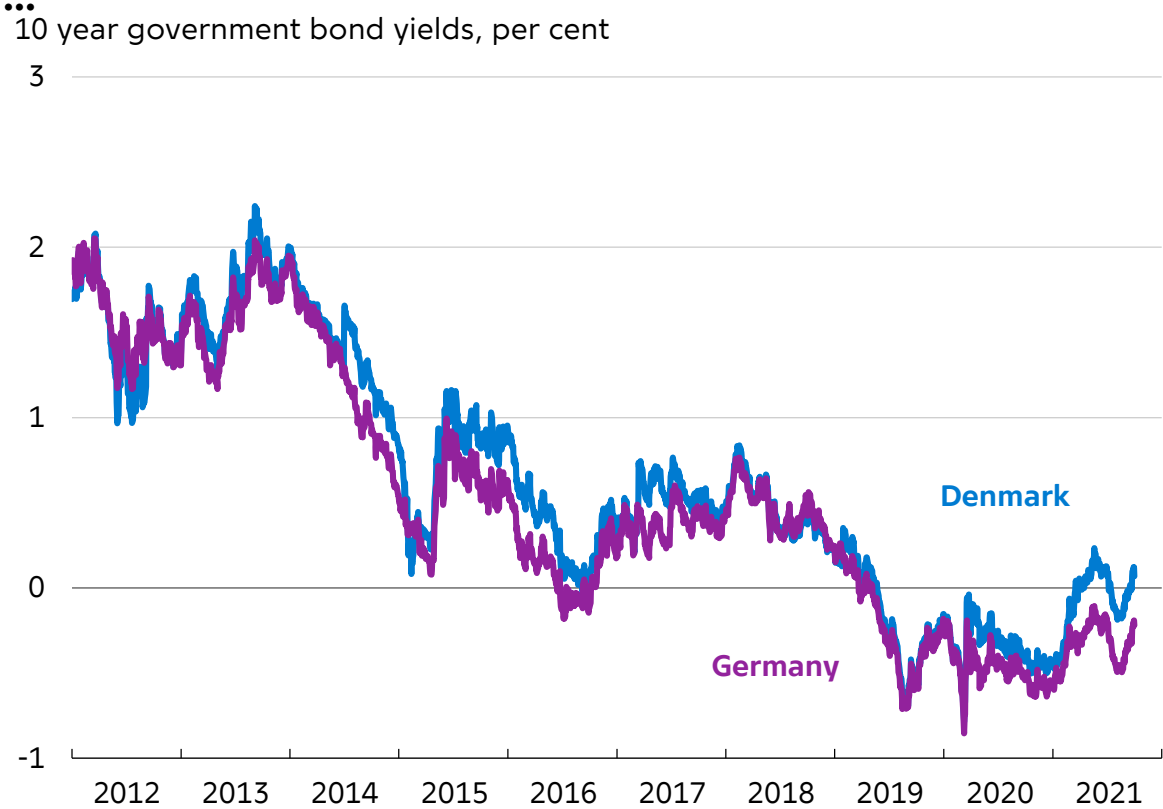
Increased longevity is likely to continue to exert downward pressure on r^* in Denmark



Source: Own calculations based on DREAM.

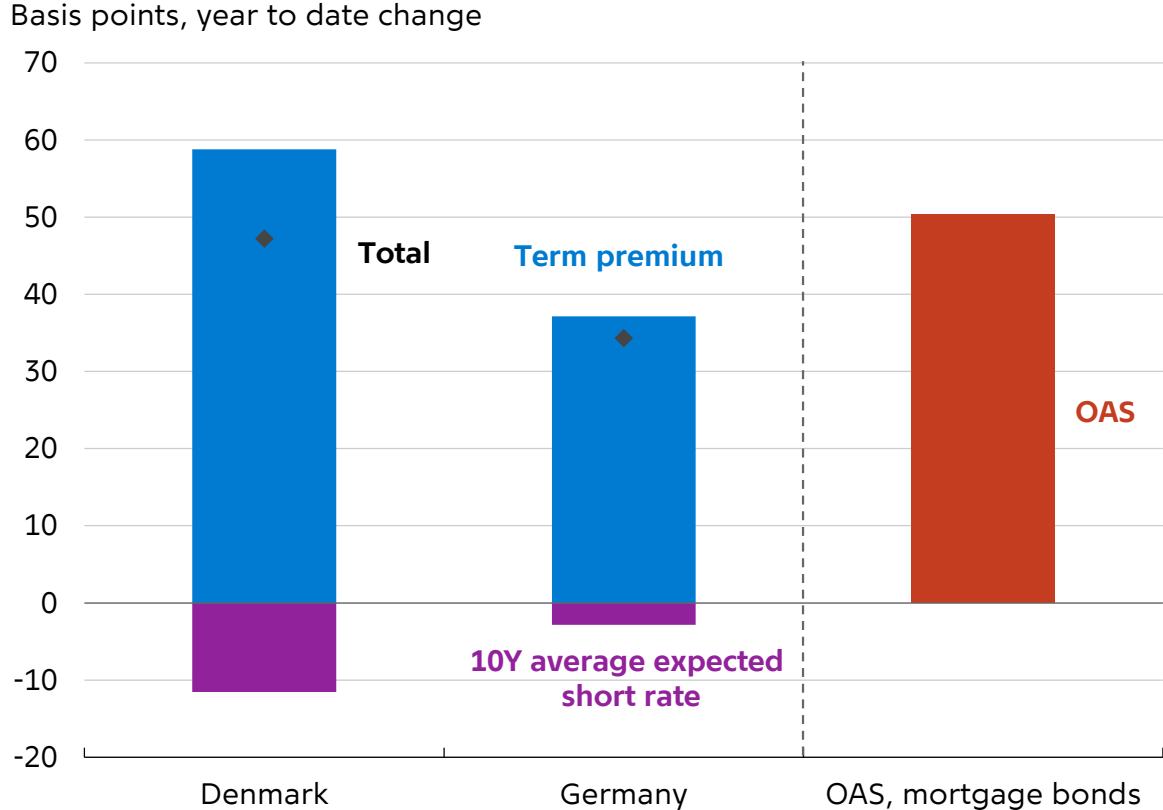
The tight spread to Germany and the occasional divergence

Danish government bond yields follow the German ones closely



Note: Generic benchmark. Source: Refinitiv Eikon.

... although the spread has increased in 2021

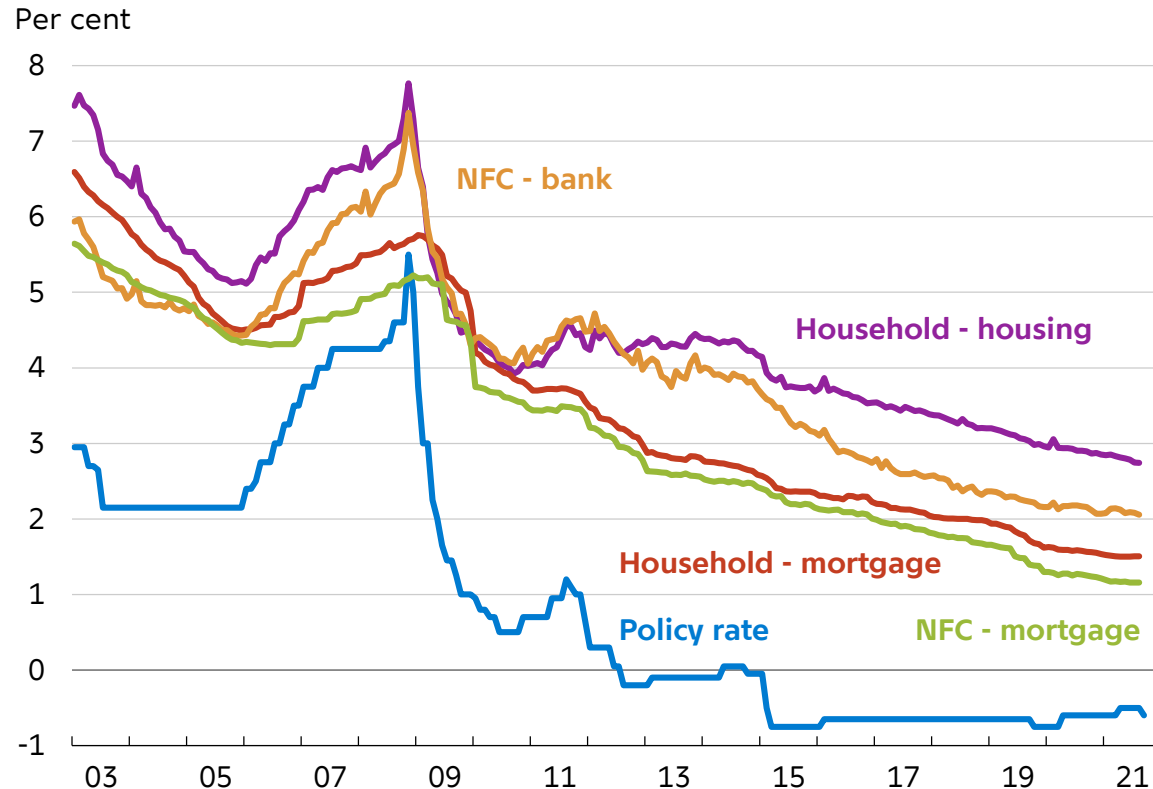


Note: Decomposition of 10-year government bond yields (zero coupon) for Denmark and Germany (left hand) based on a dynamic term structure model. Option-adjusted spread on long (+12 year) Danish callable mortgage bonds at par relative to Danish government bond curve (right hand).

Source: Nykredit, Nordea analytics and own calculations.

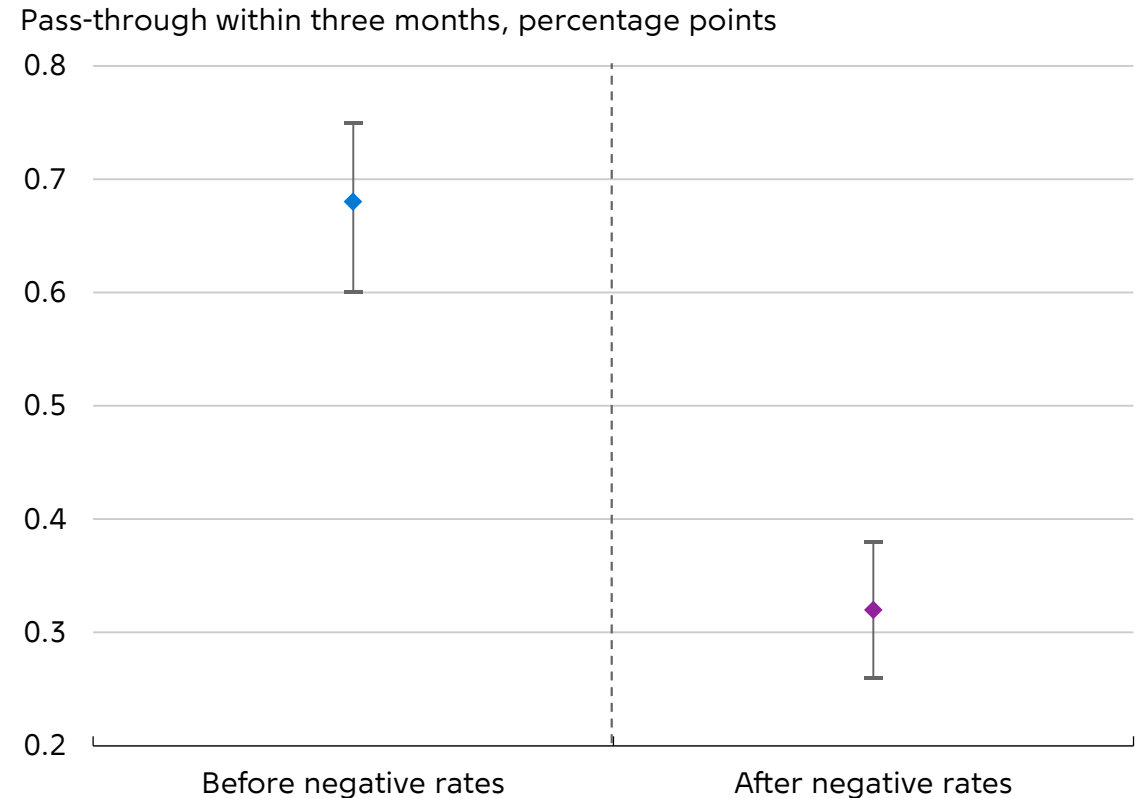
Bank lending rates are slowly declining, but no reversal rate

Lending rates have declined slowly and steadily in recent years but no reversal rate in Denmark



Note: NFC is non-financial corporations. Mortgage is lending through credit mortgage institutions. "Household - housing" is loans to households for housing purposes from banks. The last observation for the policy rate is 1 October 2021.

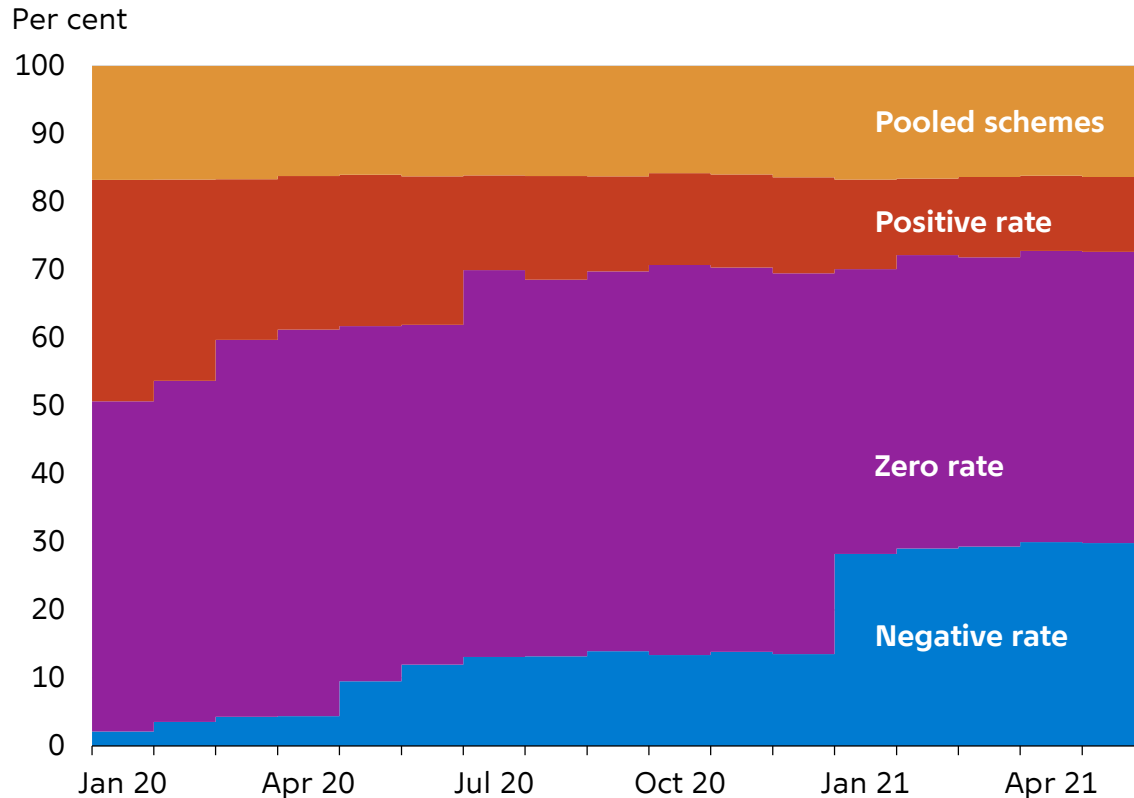
Source: Danmarks Nationalbank.



Note: Estimated pass-through to bank lending rates from policy rate changes. Dots are central estimates. Source: Adolfsen and Spange (2020).

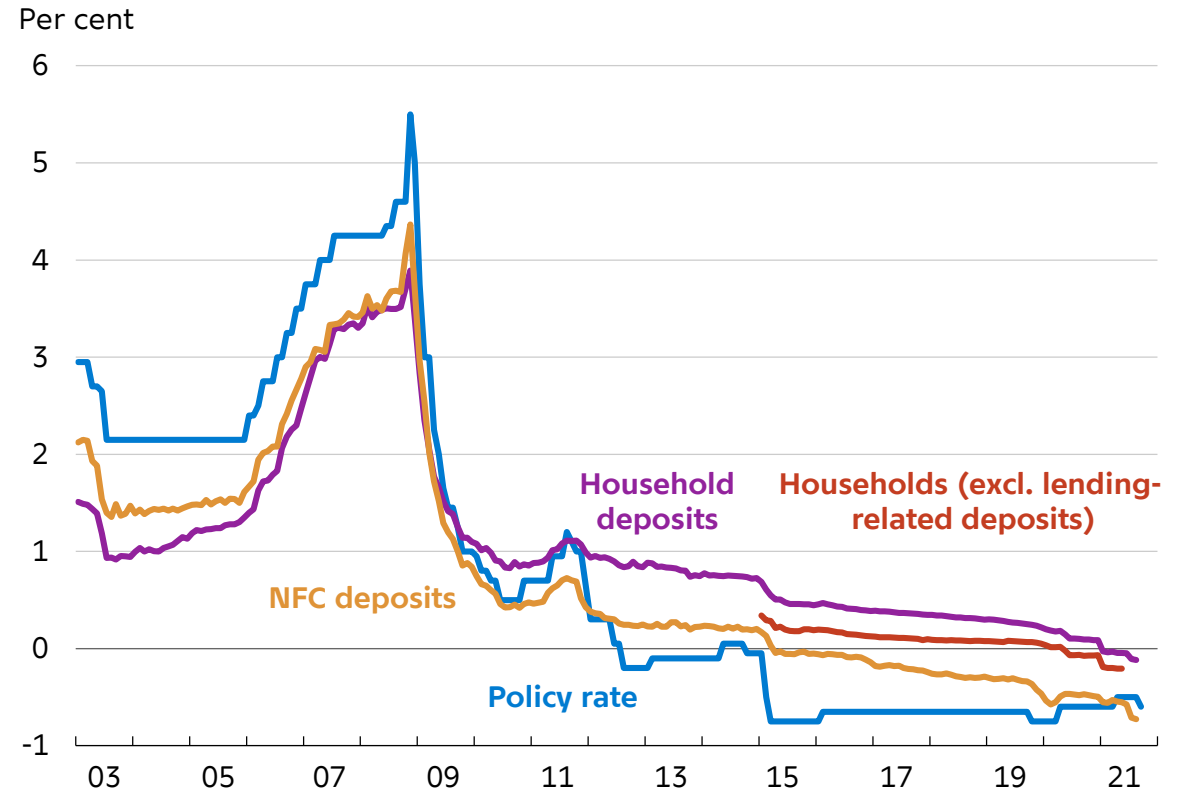
Negative deposit rates have become more widespread in Denmark

30 per cent of household deposits had negative interest rates in May 2021



Note: Distribution of total deposits in all currencies from Danish employees etc. Pool schemes are savings arrangements where deposits are invested in securities.
Source: Danmarks Nationalbank.

Transmission to household deposit rates has been sluggish, but has picked up recently

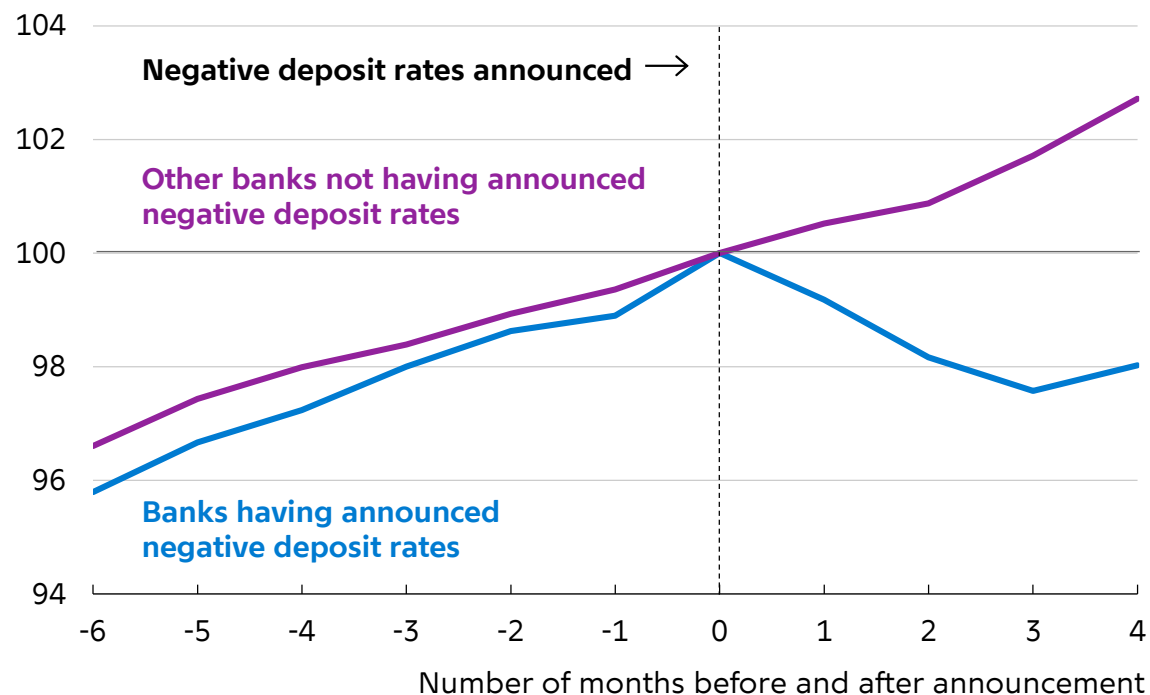


Note: Average interest rate on overnight deposits. Lending-related deposits have an interest rate equal to the matching loan and thus overstates deposit rates. Last observation for the policy rate is 1 October 2021.
Source: Refinitiv Datastream and Danmarks Nationalbank.

Households respond to negative deposit rates

Private customers reduced deposits in the first banks announcing negative deposit rates ...

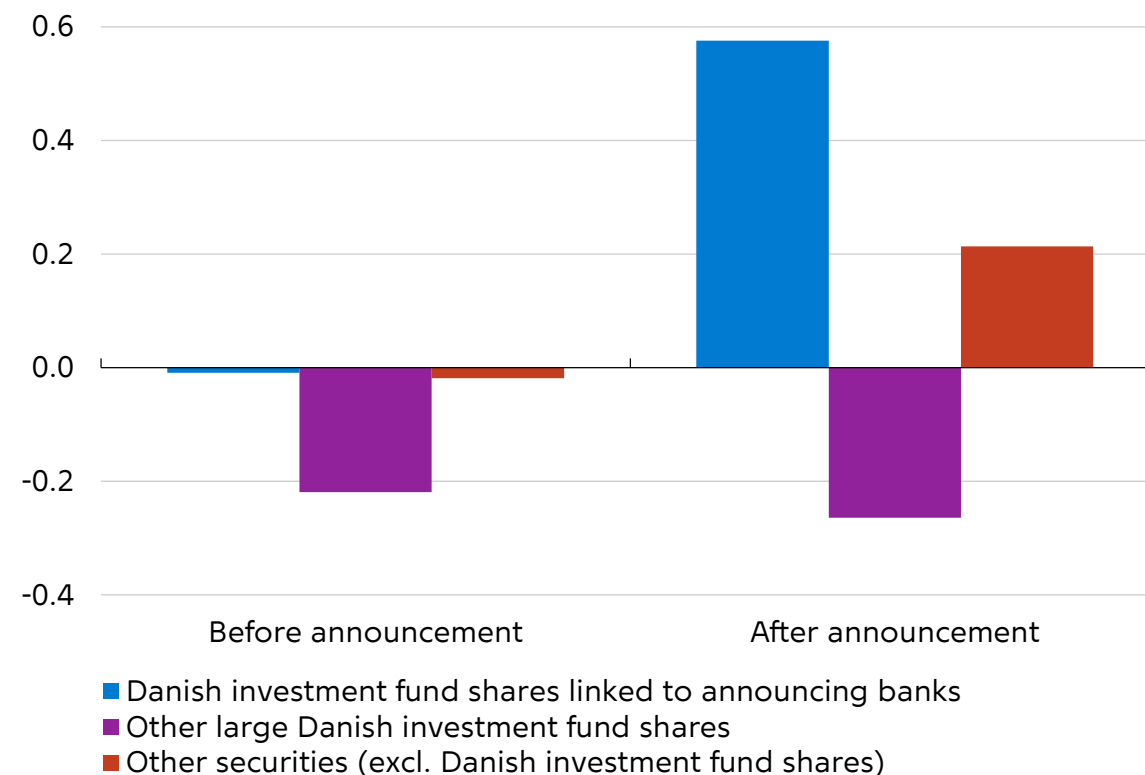
Index, time of announcement = 100



Note: Average development in deposits around the time of the announcement of negative deposit rates.
Source: Mandsberg, Otte and Spange (2021).

... and moved deposits to investment funds

Average monthly net purchases relative to portfolio, per cent



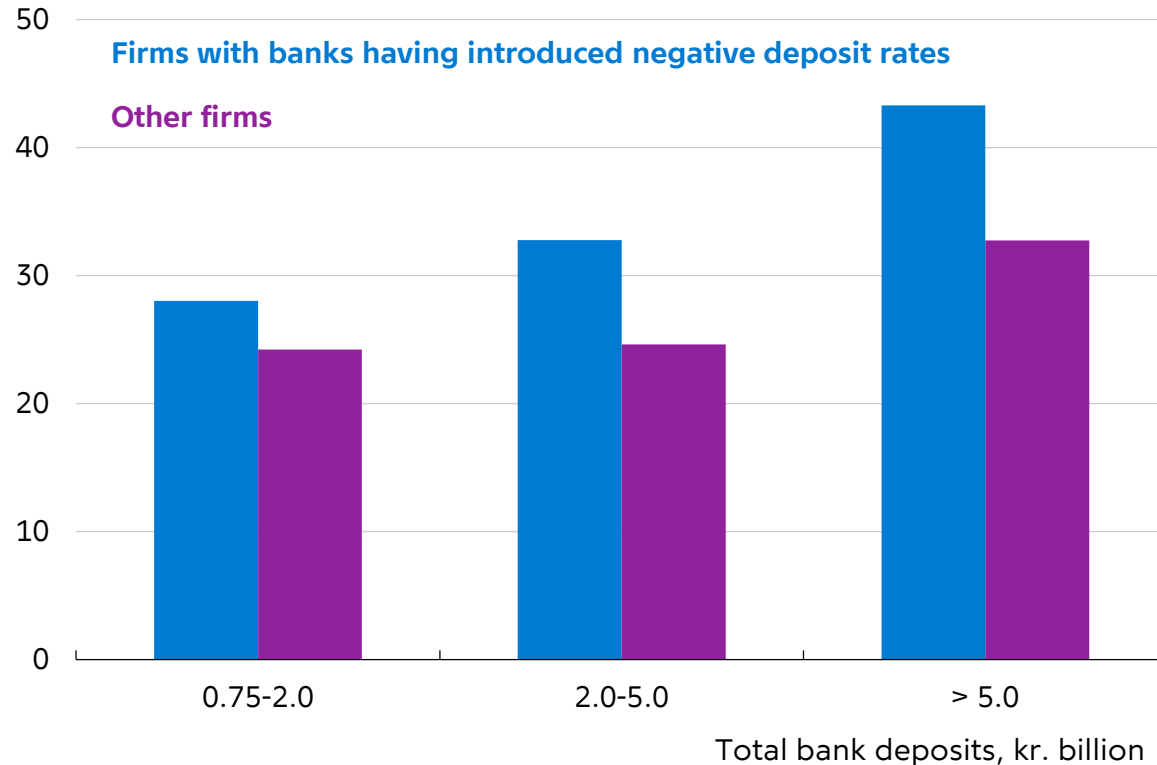
Note: Same period as left-hand chart. Net purchases are stated as a share of portfolio holdings in January 2020.
Net purchases are overestimated since reinvested dividends are included.

Source: Mandsberg, Otte and Spange (2021).

Firms facing negative deposit rates increase employment and investment

Firms react to negative deposit rates by establishing new bank connections ...

Share of firms switching bank, per cent

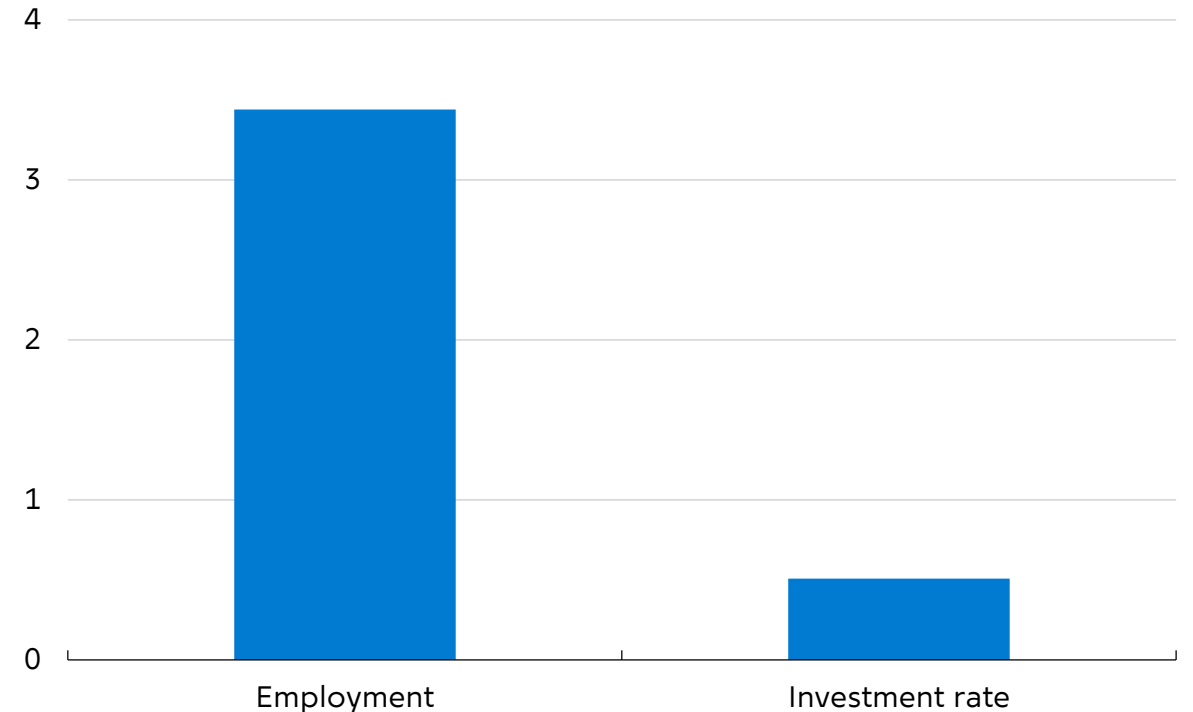


Note: Share of firms having deposits in a new bank in a given year. Firms are placed in the blue group when at least one existing bank connection had introduced negative deposit rates in the previous year.

Source: Abildgren and Kuchler (2020).

... and by increasing employment and investments

Effect of negative deposit rates after 2 years, percentage points

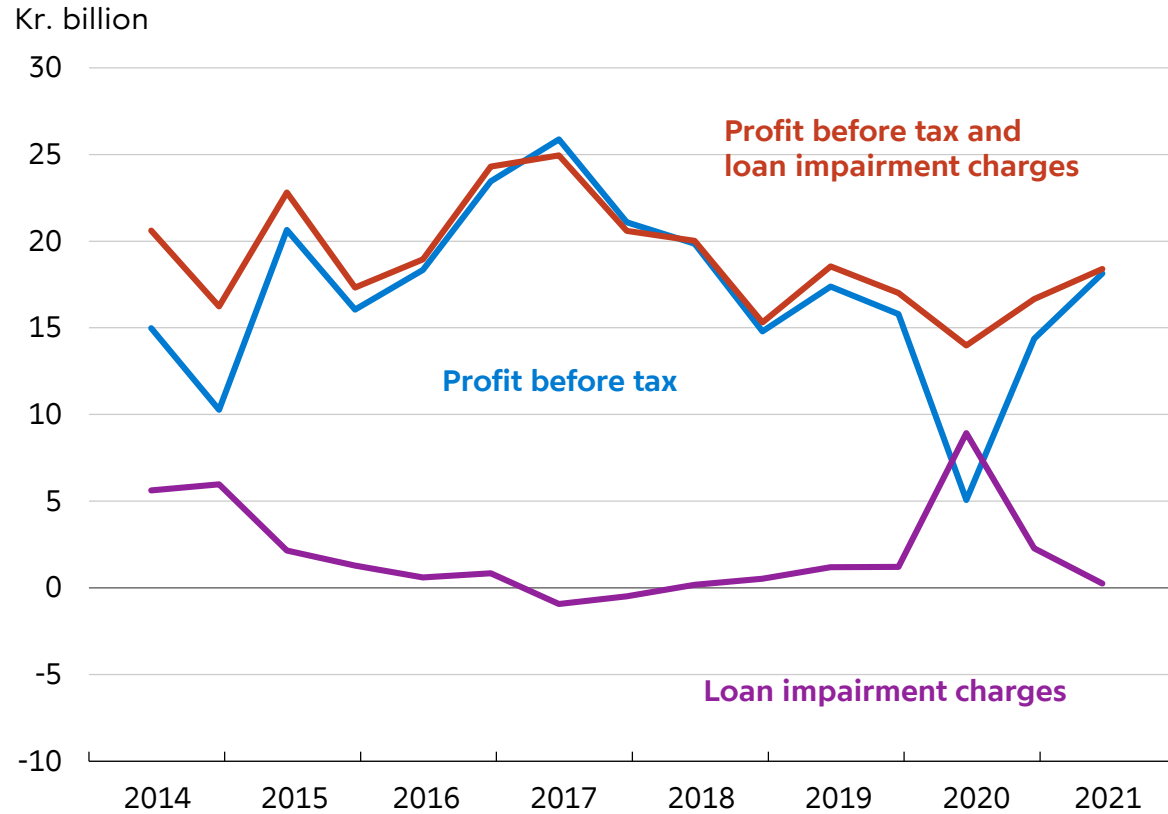


Note: Calculations compare firms with banks introducing negative deposit rates at time 0 to other firms.

Source: Abildgren and Kuchler (2020).

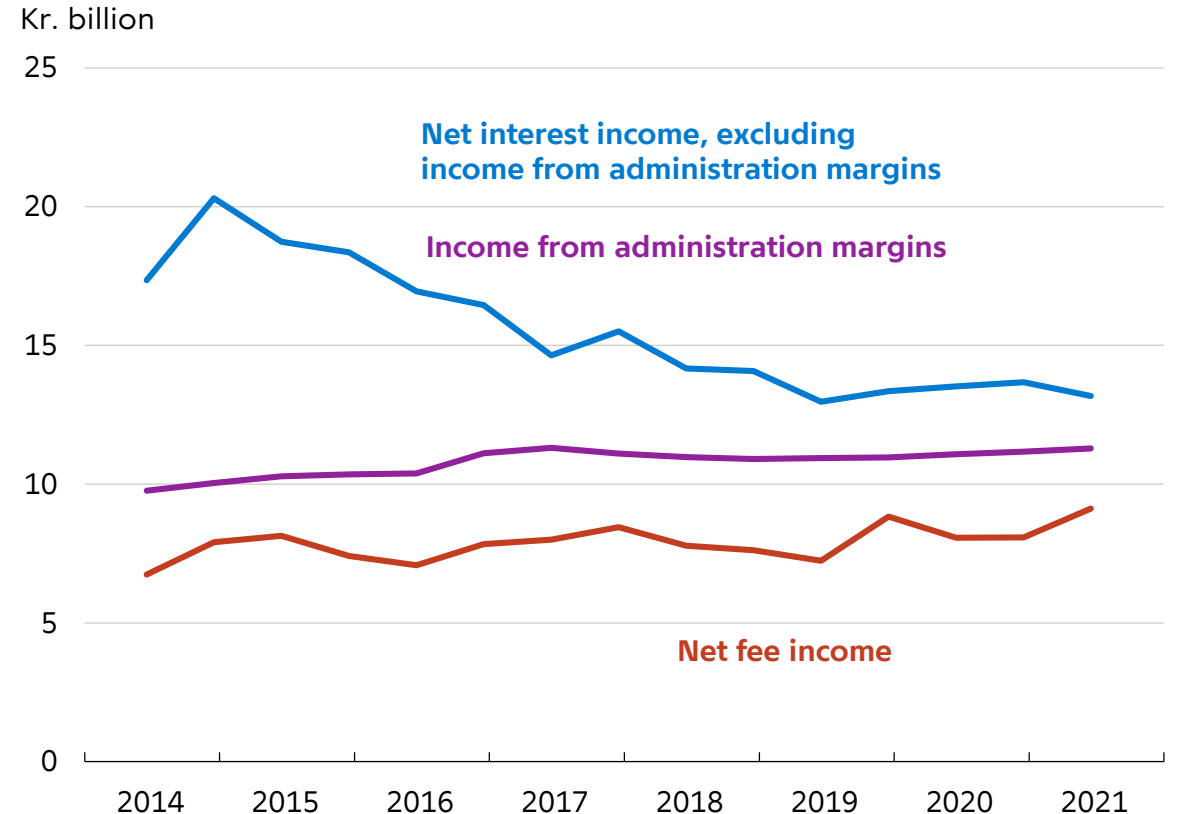
Banks' net interest income has declined, but it has stabilised recently

Impairment charges created volatility during Covid-19



Note: Systemically important Danish banks. Semi-annual data.
Source: Danmarks Nationalbank.

Changing composition of banks' income



Note: Systemically important Danish banks. Semi-annual data.
Source: Danmarks Nationalbank.

References

- Abildgren, Kim, Andreas Kuchler (2020), Do firms behave differently when nominal interest rates are below zero?, *Danmarks Nationalbank Working Paper*, No. 164, November
- Adolfsen, Jakob Feveile and Jesper Pedersen (2019), The natural real interest rate in Denmark has declined, *Danmarks Nationalbank Analysis*, No. 13, June
- Adolfsen, Jakob Feveile and Morten Spange (2020), Modest pass-through of monetary policy to retail rates but no reversal, *Danmarks Nationalbank Working Paper*, No. 154, April
- Brunnermeier, Markus K. and Yann Koby (2018), The reversal interest rate, *National Bureau of Economic Research Working Papers*, No. 25406, December
- Christensen, Frederik Bjørn and Jesper Pedersen (2021), Demographics and r^* in an OLG model for Denmark, ongoing work at Danmarks Nationalbank
- Danmarks Nationalbank (2021a), Accommodative financial conditions strengthens the upswing, *Danmarks Nationalbank Analysis (Monetary and Financial Trends)*, No. 23, September
- Danmarks Nationalbank (2021b), Danes invest over half of their available funds, *Danmarks Nationalbank Statistical News*, September
- Jensen, Jakob Roager, Jakob Guldbæk Mikkelsen and Morten Spange (2017), The ECB's unconventional monetary policy and the role of exchange rate regimes in cross-country spillovers, *Danmarks Nationalbank Working Paper*, No. 119, October
- Mandsberg, Rasmus Kofoed, Alexander Meldgaard Otte and Morten Spange (2021), The response of household customers to negative deposit rates, *Danmarks Nationalbank Analysis*, No. 9, April
- Pedersen, Jesper (2015), The Danish natural real rate of interest and secular stagnation, *Danmarks Nationalbank Working Paper*, No. 94, March
- Schnabel, Isabel (2021), The monetary policy non-puzzle in bond markets, *Speech at the Bond Market Contact Group Meeting*, 15 September

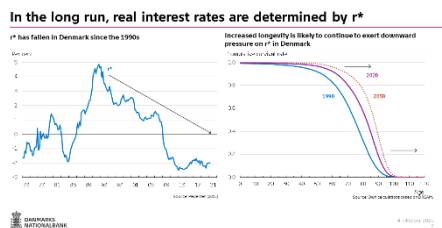
PANEL SPEECH

NOTES FOR ASSISTANT GOVERNOR

THOMAS HARR'S PANEL SPEECH

AT DANISH FINANCE INSTITUTE ANNUAL CONFERENCE 2021, 7 OCTOBER 2021

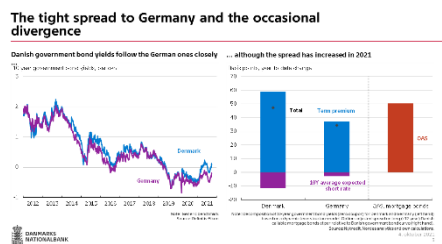
CHECK AGAINST DELIVERY



Slide 2:

- The equilibrium real rate of interest, r^* , has fallen substantially in many economies, including Denmark.
- In a small open economy, r^* is very dependent on global forces such as world potential output growth, international demographics, inequality and safe asset shortage.
- However, due to financial frictions, r^* in a small open economy may differ from the 'global r^* '.
- The chart to the left illustrates Danmarks Nationalbank's estimates of r^* in Denmark, see Pedersen (2015).
- The fall in r^* since the mid-1990s can be explained by lower potential growth in Denmark, as well as changes in international demographics, global savings and financial uncertainty, cf. Adolfsen and Pedersen (2019).
- Model uncertainty and the unobservability of r^* imply that the focus should be on the trend of r^* and not the exact level.
- However, the secular decline in r^* is a common and very robust finding across many economies and across models, including for Denmark.

- Preliminary results based on a multi-period, two-economy overlapping generations (OLG) model with financial frictions built at Danmarks Nationalbank suggest that demographic changes have affected r^* negatively in Denmark for several decades, see Christensen and Pedersen (2021).
- We expect the projected increase in longevity to continue to exert downward pressure on r^* in Denmark in coming decades.
- Note, however, that the indexation of the retirement age to changes in life expectancies in Denmark should reduce the impact from increased longevity on r^* .

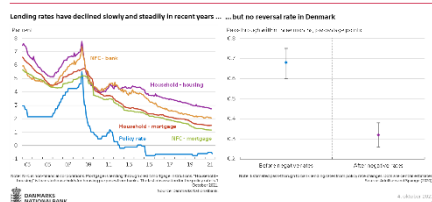


Slide 3:

- Since the late 1990s, Danish's government bond yields have followed German government bond yields closely.
 - This reflects very small exchange rate movements between the euro and the Danish krone since the introduction of the euro.
 - It also reflects the fact that both countries have the highest credit rating from the three major rating agencies.
- During 2021, government bond yields have increased in both Germany and Denmark.
 - In Germany, nominal yields have risen less than inflation (actual or expected), implying a fall in real rates.
 - This may be explained by the ECB's PEPP and a perceived change in the reaction function of the central bank, cf. Schnabel (2021).
- Long term Danish government bond yields have risen slightly more during the year than in Germany due to a larger increase in term premia in Denmark.
- The option-adjusted spread (OAS) between the yield on long-term fixed rate, callable mortgage bonds and long-term government bonds in Denmark has also widened in 2021.
- One potential explanation for the increased term premium in Danish government bonds during 2021 and the rise in OAS on Danish mortgage bonds is a substantially higher duration risk in the Danish callable mortgage bond market following the interest rate increases during the year.

- When yields increase and bond prices decline, the probability of the prepayment option in Danish mortgage bonds being exercised falls, increasing the expected maturity of the callable bonds and thus their duration risk.
- The rise in OAS on Danish mortgage bonds may be related to the fact that foreign investors have been less active buyers in 2021. This year, for the first time since 2014, Japanese investors have been selling callable mortgage bonds, cf. Danmarks Nationalbank (2021a).
- Higher duration risk might lower some investors' demand for duration assets, such as high maturity government bonds, potentially explaining the wider Danish-German government bond spreads.
- Another potential explanation for the rise in the Danish-German government bond spread during 2021 is the ECB's PEPP, which has put downward pressure on German yields, see Schnabel (2021), but may not have spilled over to Danish yields one-to-one.

Bank lending rates are slowly declining, but no reversal rate

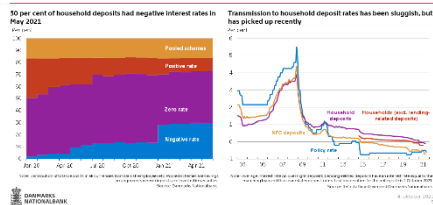


Slide 4:

- Since 2015, bank lending rates have gradually declined, although monetary policy rates have not been reduced (see left-hand chart).
- The reversal rate is a point where further cuts in the monetary policy rate are followed by an increase in bank lending rates or a reduction in lending volumes and thus have contractionary effects, see, for example, Brunnermeier and Koby (2018).
- In theory, the reversal rate could occur because banks have been reluctant to cut (household) deposit rates into negative, meaning that monetary policy rate cuts affect their asset side and not their liabilities. As such, reductions in policy rate could reduce banks' earnings, but increased lending rates could compensate for that.
- Besides that, the sticky pass-through to deposit rates could imply that banks with a high share of deposits relative to total liabilities could experience a larger reduction in earnings, lowering their lending capacity.

- We find no evidence of a reversal rate in Denmark, cf. Adolfsen and Spange (2020). While the immediate pass-through to bank lending rates has been lower following the introduction of negative policy rates, the direction has not changed.

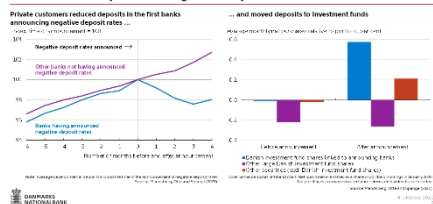
Negative deposit rates have become more widespread in Denmark



Slide 5:

- 30 per cent of household bank deposits were remunerated at a negative rate in May 2021.
- Since then, the number has increased as banks have lowered their exemption thresholds (currently, typically kr. 100,000).
- The average deposit rate for households was -12bp in August 2021 (-21bp in May 2021, excluding lending-related deposits).
- In the Euro area, average household deposit rates recently turned slightly negative in Germany and Belgium.
- NFCs have faced negative deposit rates since 2015.
- Recently, the average deposit rate for NFCs fell below Danmarks Nationalbank's policy rate for the first time since 2012.

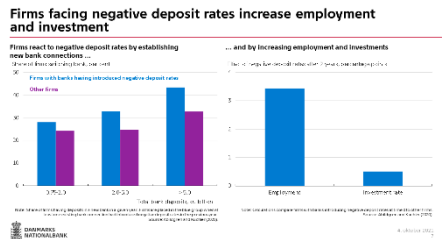
Households respond to negative deposit rates



Slide 6:

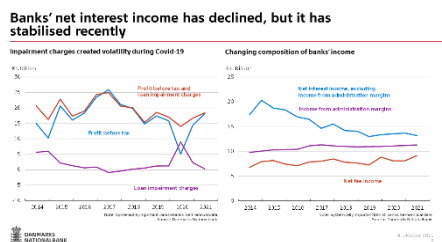
- Negative deposit rates for household customers are now being applied by most banks in Denmark, while banks have gradually reduced the thresholds for when negative interest rates are being imposed.
- There are indications that private customers responded to the announcement of negative deposit rates by moving their deposits to other banks which have not yet announced negative deposit rates for households, cf. Mandsberg, Otte and Spange (2020) (left-hand chart).

- Private customers appear to have increased their demand for investment fund shares and switch their deposits to pool schemes when faced with prospects of negative deposit rates (right-hand chart).
- Over the past year, for every kr. 100 Danish households have saved in financial assets, kr. 40 have been invested via investment funds. In comparison, households have invested kr. 17 by directly buying stocks or bonds, cf. Danmarks Nationalbank (2021b).



Slide 7:

- We find that firms exposed to negative deposit rates are more likely to engage in new banking relationships and rebalance their bank deposits towards banks that have not (yet) introduced negative deposit rates, cf. Abildgren and Kuchler (2020).
- We also find that firms exposed to negative deposit rates to a higher degree than other firms increase their employment and investment.
- They also tend to reduce their degree of leverage and rebalance their portfolio of liquid assets away from deposits and towards other types of liquid assets, e.g. stocks, bonds or cash.



Slide 8:

- Danish SIFI banks' profit before tax has declined in recent years, most notably in the first half year of 2020.
 - The decline in 2020 was mainly related to larger impairment charges (see left-hand chart). The increase in

impairment charges was primarily made in Q1 2020 based on model estimates and management judgements. A large part of the higher impairment charges has not yet materialised.

- Since the introduction of negative policy rates, SIFI banks' net interest income has declined, but it has stabilized recently.
 - The decline in banks' interest rate margin partly reflects the gradual fall in lending rates, whereas household deposit rates stayed above zero for a long time.
 - The decline in net interest income has partly been offset by higher income from fees and administration margins.
 - Since 2019, the introduction of negative interest rates on household deposits above a certain threshold, has supported a stabilization in net interest income.