

# DANMARKS NATIONALBANK

17 JUNE 2020 — NO. 11

MONETARY AND FINANCIAL TRENDS – JUNE 2020

## Stabilisation of financial markets after COVID-19 turmoil



**Global financial markets have stabilised** following turmoil in March, triggered by the global outbreak of the COVID-19 pandemic and the actions taken to contain the virus. Large asset purchasing programmes and actions to support liquidity have contributed to market stabilisation.



**Danmarks Nationalbank offered liquidity** through an extraordinary lending facility and via swap lines with the Federal Reserve and the European Central Bank. Danmarks Nationalbank followed its usual reaction pattern to prevent capital outflows in March by increasing the rate on certificates of deposit by 15 basis points following foreign exchange interventions of kr. 65 billion.



**Financial conditions are still accommodative** and supports the Danish economy. Since end-March financial markets have stabilised and households' and corporations' borrowing costs are back on pre-COVID-19 levels.

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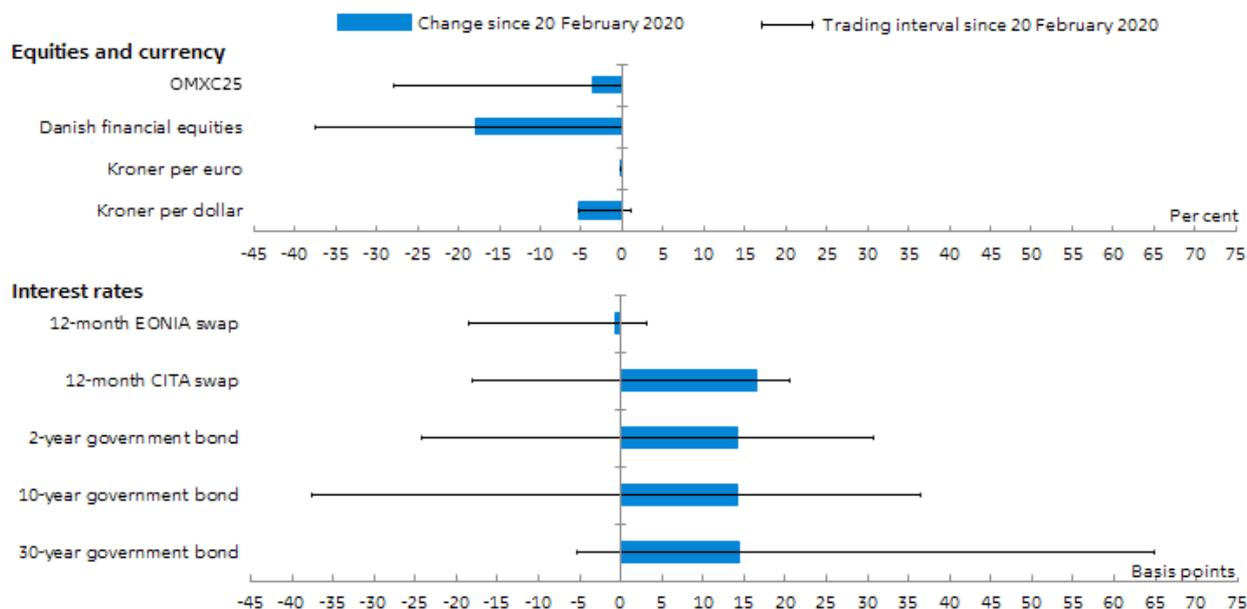
## Key trends in the financial markets since the global outbreak of COVID-19

In recent months, the global financial markets have been relatively calm following the turbulence in March in the wake of the global outbreak of COVID-19 and subsequent actions taking to contain the virus. The market turmoil temporarily led to a tightening of financial conditions through falling equity prices and rising interest rates.

Since end March global financial markets have stabilised, supported by significant monetary easing from central banks. Asset purchasing programmes have strengthened the transmission of monetary policy, and swap lines and lending facilities have provided access to liquidity. The monetary policy has eased financial conditions, and in Denmark they are back to pre-COVID-19 level. Credit growth remains moderate despite indications of higher demand for loans and overdrafts.

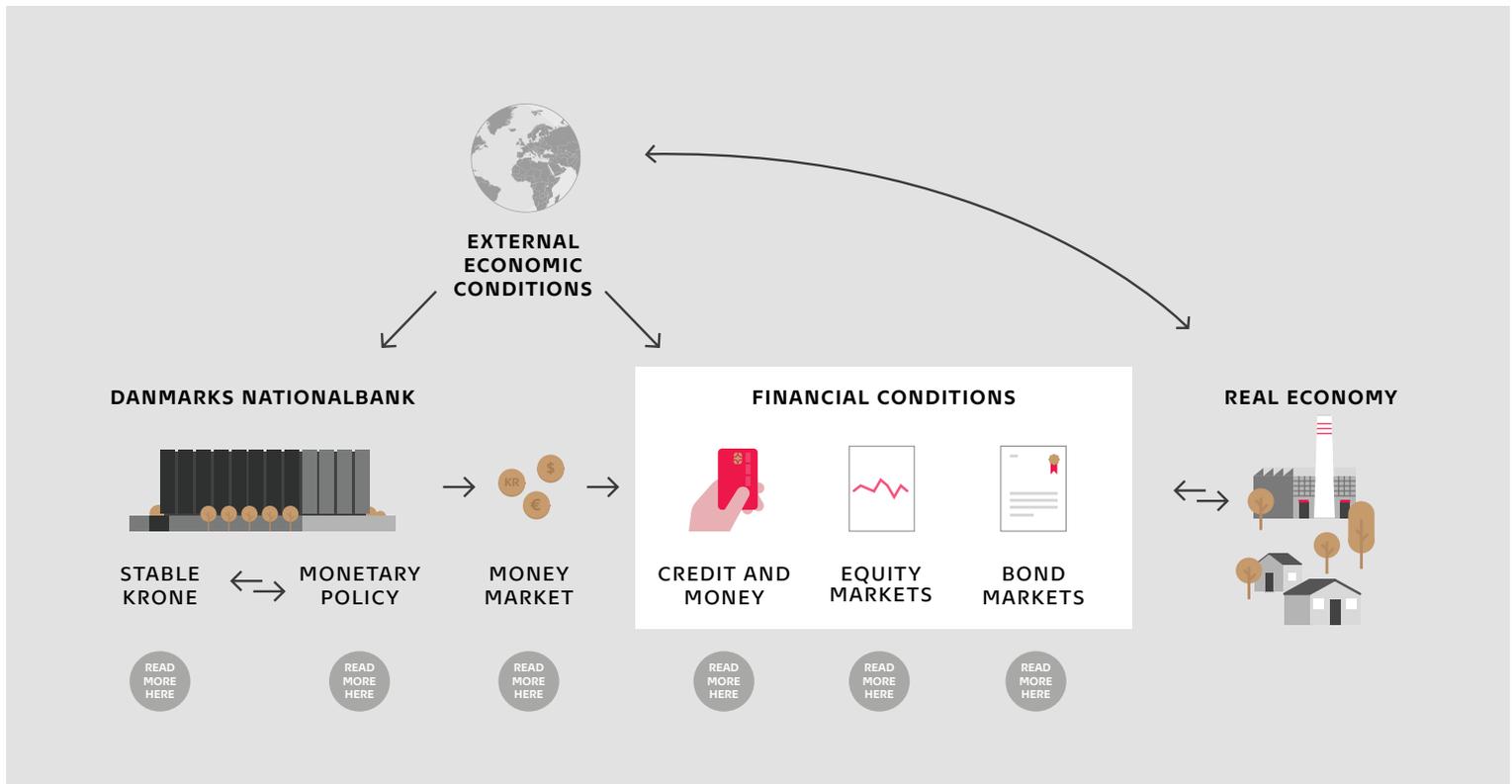
The financial turmoil in March caused capital outflows from Denmark, leading to a weakening pressure on the Krone towards the Euro. Danmarks Nationalbank increased the interest rate on certificates of deposit by 15 basis points to -0.60 per cent in March after interventions in the foreign exchange market for a total of kr. 65 billion. Subsequently, the Krone's exchange rate towards the Euro has stabilised at a level above the central rate. Danmarks Nationalbank implemented additional monetary policy actions in March to ensure liquidity for the Danish money market. These include swap lines with the ECB and the Fed and an extraordinary lending facility, among others. As markets have stabilised the use of the facilities have declined.

### Overview: Financial markets since 20 February 2020



Note: The blue bar indicates the change at the end of the editorial period on 12 June 2020 in relation to the starting point, 20 February 2020. The endpoints of the black lines indicate the largest and smallest changes, respectively, in the period beginning on 20 February 2020.

Source: Refinitiv Eikon.



## The economy and financial conditions

The outlook for the Danish and the international economy changed fundamentally due to the outbreak of the COVID-19 pandemic in February and March. Behavioral changes and actions taken to contain the virus implied a lock-down of large parts of the societies leading to a sharp drop in economic activity.<sup>1</sup>

The outlook is affected by extraordinary uncertainty regarding the magnitude and duration of the draw-back, but there has not been contagion to financial markets, however. This reflects two circumstances: Central banks have stabilised financial markets through asset purchasing programmes and actions to support liquidity. Additionally, the COVID-19 crisis is a real economic crisis that is not triggered by imbalances in the financial sector contrary to the Financial Crisis.

The extraordinary macroeconomic uncertainty makes financial markets vulnerable for contagion in case of increases in volatility, which could tighten financial conditions and feed back to the real economy.

The outbreak of COVID-19 tightened temporarily financial conditions in the Danish economy. This was reflected, inter alia, in higher financing costs for both non-financial corporations and households. Financing costs have since fallen back to pre-COVID-19 levels. As a result, the financial conditions remain accommodative, supporting economic development. The temporary tightening of financial conditions also occurred in other countries, including the euro area and the USA, where it was both more extensive and longer lasting.<sup>2</sup>

### **Mortgage yield fluctuations have not affected household financing costs**

Household financing primarily takes place through mortgage loans, accounting for around 65 per cent<sup>3</sup> of households' external financing.

1 See Danmarks Nationalbank, Prospects of gradual economic recovery, Outlook for the Danish economy, *Danmarks Nationalbank Analysis*, No. 12, June 2020.

2 Pandemic central banking: monetary stance, market stabilization and liquidity, speech, ECB, May 2020 and Danmarks Nationalbank, Prospects of gradual economic recovery, Outlook for the Danish economy, *Danmarks Nationalbank Analysis*, No. 12, June 2020.

3 See Box 1 of Danmarks Nationalbank, Decline in Interest rates and refinancing boom, *Danmarks Nationalbank Analysis (Monetary and financial trends)*, No. 19, September 2019.

The financial market turmoil during March led to higher mortgage rates, see the section *Bond markets*. In isolation, this increased the price of market-based financing through the mortgage market, resulting in a temporary increase of household financing costs, see Chart 1. Mortgage yields have subsequently fallen back and have roughly returned to the level before the COVID-19 crisis.

The short increase in mortgage rates implied that the pass-through to households' borrowing costs was limited. Hence, the tightening of households' actual borrowing costs was not considerable.

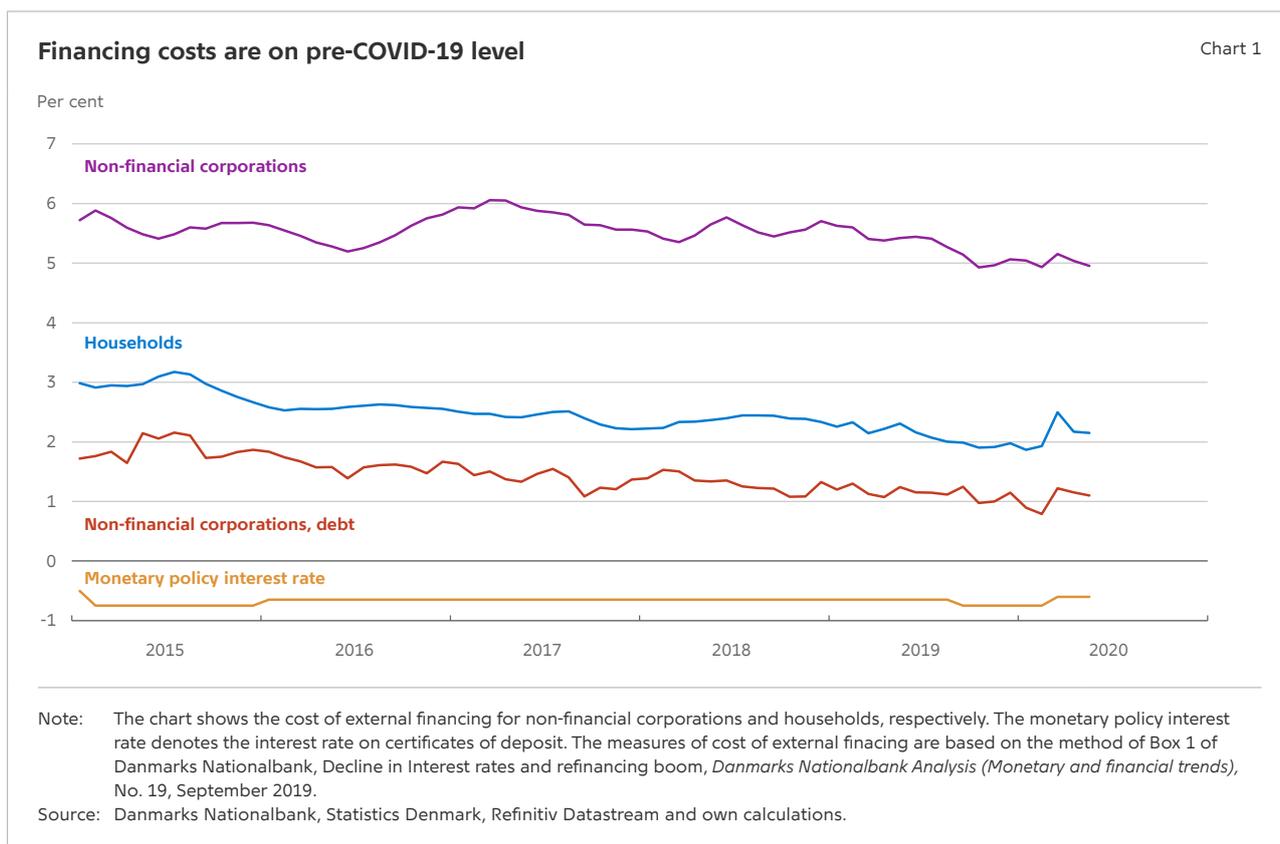
### Low debt and unchanged equity risk premium have underpinned corporate financing costs

Non-financial corporations use a wider range of sources of financing. Besides debt financing, they

also rely heavily on equity financing, which accounts for just over half of their external financing.<sup>4</sup>

Larger market rates on mortgages temporarily increased corporate debt financing costs, see Chart 1. At the same time, the price of debt financing was also pushed slightly upwards by higher prices of market-based financing via bond issuance, see the section *Bond markets*. Compared with other countries, e.g. the USA and the euro area, Danish corporates use market-based financing via bond issuance to a far smaller extent. This contributed to dampening the increase in financing costs in March relative to e.g. the euro area.<sup>5</sup>

The increase in costs of equity financing was very limited compared to other countries.<sup>6</sup> This reflects, inter alia, small fluctuations in the Danish equity risk



4 See Box 1 of Danmarks Nationalbank, Decline in Interest rates and refinancing boom, *Danmarks Nationalbank Analysis (Monetary and financial trends)*, No. 19, September 2019.

5 Pandemic central banking: monetary stance, market stabilization and liquidity, speech, ECB, May 2020.

6 The development in the price of equity financing depends on equity market developments: The higher the rate of return required by equity investors, the higher the equity financing costs.

premium during the COVID-19 pandemic, see the section *Equity markets*.

In contrast to debt financing costs, costs of equity financing have remained relatively stable since the start of the COVID-19 outbreak.

For several years, Danish firms have increasingly consolidated themselves through debt reduction relative to total assets.<sup>7</sup> At the same time, after the financial crisis the largest firms have to a higher degree tended to apply leverage targets defining targets for the (net) debt-to-profit ratio, see Box 1.<sup>8</sup> Corporates' focus on debt reduction before the COVID-19 crisis, as well as the unchanged price of equity financing, have implied that their total financing costs have been less impacted by COVID-19. This has helped to support accommodative financial conditions for corporates during the COVID-19 crisis.

## Monetary policy and money markets

### Danmarks Nationalbank raised the key policy rate and introduced new lending facilities in March

Danmarks Nationalbank has implemented a number of monetary policy actions since March. Among other measures, Danmarks Nationalbank raised the interest rate on certificates of deposit rate by 15 basis points in mid-March to -0.6 per cent. This increase following by interventions in the foreign exchange market, see the section *Krone demand and foreign exchange markets*.

Danmarks Nationalbank also introduced an extraordinary lending facility in March to ensure sufficient liquidity to the money market. The lending facility enables monetary policy counterparties to borrow liquidity for 7 days and 3 months, respectively, against collateral at a variable interest rate of

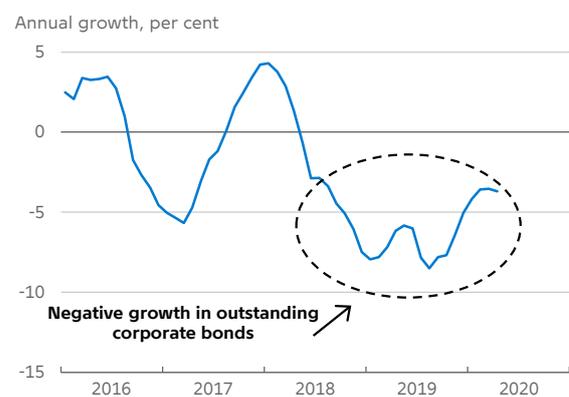
### Widespread leverage targets among the largest non-financial corporations and low debt

Box 1

Financing via corporate bond issuance has declined in recent years, see Chart A. This should be viewed in the light of substantial corporate profits in recent years and non-financial corporations' build-up of liquid reserves. In addition, following the financial crisis several of the largest non-financial corporations have started applying published leverage targets, which have set a limit to the (net) debt-to-profit ratio. Since 2006, the proportion of the largest non-financial corporations with leverage targets has increased from 12 per cent to 53 per cent, and actual debt ratios have roughly halved. This appears from calculations based on their financial statements.

In the annual reports from 2019, the average debt policy involved a debt of 2.0 times the annual gross profit (EBITDA). The largest non-financial corporations generally apply a margin on their leverage targets and have an average debt ratio of only 0.9 times their profits. Consequently, in the absence of investments, equity buy-backs etc., they will be able to use their profits to repay all debt within a short time frame. This is attributable to non-financial corporations, on average, having a low debt-to-liquidity ratio and high profits at the same time.

### Decreasing level of outstanding corporate bonds despite declining interest rates



Note: Reflects all outstanding corporate bonds of Danish non-financial corporations. Four-quarter moving average.  
 Source: Danmarks Nationalbank.

7 See Box 3 in Danmarks Nationalbank, Low interest rates support the upswing, *Danmarks Nationalbank Analysis (Monetary and Financial Trends)*, No. 5, March 2019.

8 The largest non-financial corporations cover corporations in the large cap stock index. Net debt is expressed as the difference between interest-bearing debt and cash. Profit is defined as the gross profit measured as EBITDA, i.e. earnings before interest, taxes, depreciation and amortisation.

currently -0.35 per cent, i.e. 40 basis points lower than the rate of interest on the existing lending facility.

The monetary policy counterparties currently have loans for kr. 9 billion, cf. Chart 2. The demand for loans is therefore significantly lower than in March 2020, where counterparties took out loans for kr. 86 billion. The high demand in March is related to Danmarks Nationalbank's sales of foreign exchange for kr. 65 billion to stabilise the krone. This reduced the amount of excess liquidity in the money market through a decrease in the net position of banks.

Danmarks Nationalbank also entered into agreements on swap lines<sup>9</sup> with the ECB and the Fed in March to ensure access to liquidity in euro and dollar, see below in this section.

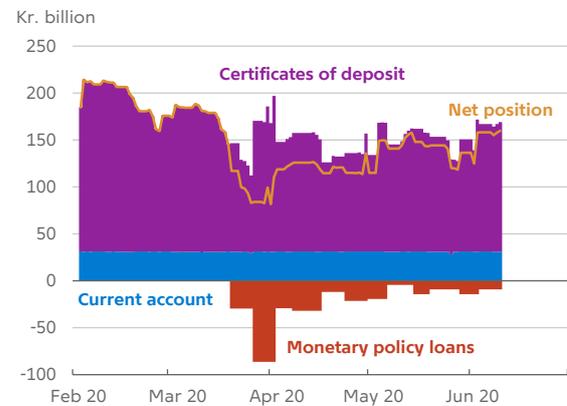
#### New extraordinary lending facilities may have affected money market rates

Short-term money market rates, illustrated here as a 1-month Cita swap rate, have risen by around 25 basis points since the end of February, see Chart 3. The increase partly reflects Danmarks Nationalbank's increase in the rate on certificates of deposit by 15 basis points in March.

The remainder of the increase may reflect the change for the banking sector from ample central bank liquidity to a situation where some banks demand liquidity in the money market. Since the Cita swap rate is based on the overnight T/N interest rate, which is a lending rate, it may have contributed to the money market interest rate moving closer to the interest rate on the extraordinary lending facility and further away from the interest rate on certificates of deposit, see Chart 3. At the same time, the T/N rate, currently the reference rate in the Danish money market, is frequently based on quoted rates, which have systematically been slightly higher than the transaction-based interest rates. Unlike the Cita swap rate, the overnight interest rate on O/N deposits (also known

**Banks demanded liquidity**

Chart 2

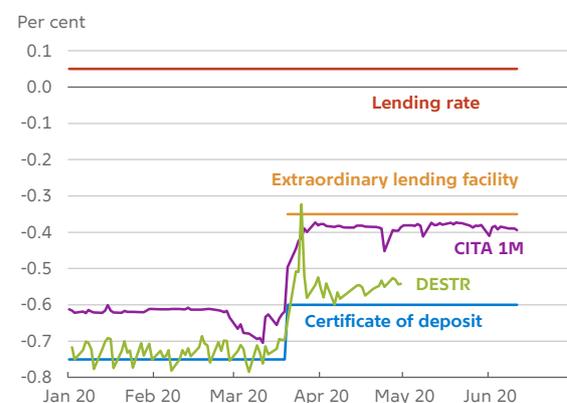


Note: The net position refers to the total net balance of monetary policy counterparties in Danish kroner with Danmarks Nationalbank. It is defined as counterparties' holdings of certificates of deposit and current account deposits less the monetary policy loans. Last observation is 10 June 2020.

Source: Danmarks Nationalbank.

**Money market interest rates have increased**

Chart 3



Note: Cita 1M is the interest rate on a 1-month Cita swap. DEST R is based on the overnight interest rate on O/N deposits.

Source: Danmarks Nationalbank and Refinitiv Datastream.

<sup>9</sup> A swap line is an agreement between two central banks to exchange currency. For example, the ECB can borrow dollars from the Fed against collateral in euro. This ensures the euro area access to dollar liquidity.

as DEST<sup>10</sup>) has increased by only 15 basis points, corresponding to the increase in the interest rate on certificates of deposit.

### Extensive monetary policy easing globally

The world's largest central banks have implemented several actions to ease monetary policy during the COVID-19 pandemic. The easing includes interest rate cuts, asset purchase programmes and several actions to ensure liquidity. The latter include, among other things, favourable lending facilities and swap lines between central banks. The monetary policy easing measures contributed, inter alia, to dampening the turmoil in global financial markets in March. This has also had an effect on the financial markets in Denmark.

### The ECB has reduced long-term lending rates and increased asset purchase programme

In response to the outbreak of COVID-19, the ECB reduced interest rates on its long-term lending facility via lending facilities targeted at corporates and households (TLTRO III) see Chart 4. The easing supports access to liquidity and increases banks' incentive to increase lending to the economy.

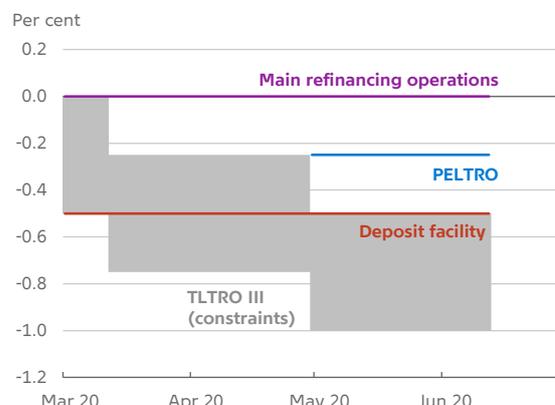
The ECB temporarily increased its existing asset purchase programme by EUR 120 billion in response to the COVID-19 outbreak. The ECB subsequently introduced a new extraordinary asset purchase programme (the pandemic emergency purchase programme – PEPP<sup>11</sup>) that significantly increased monthly purchases. In April and May, the ECB bought securities for a total of almost EUR 300 billion, see Chart 5. The large ECB purchases were initially targeted to ensure sufficient market liquidity for the government and corporate bond markets, inter alia, thereby strengthening the transmission of monetary policy through more accommodative financing costs for both sovereigns and firms in the euro area. This

10 Finance Denmark has proposed to let overnight deposits (O/N deposits) form the basis for the new overnight reference rate called DEST<sup>R</sup> (Denmark Short-Term Rate). DEST<sup>R</sup> is currently in the testing phase, and it must be decided during 2020 whether DEST<sup>R</sup> should be a benchmark Danish reference rate.

11 The Pandemic Emergency Purchase Programme is a temporary asset purchase programme with an initial envelope of up to EUR 750 billion. The 4<sup>th</sup> of June 2020 ECB increased the envelope by EUR 600 billion, making the total envelope EUR 1.350 billion, currently. The aim is to ensure the transmission of monetary policy to the whole euro area. The programme covers securities issued by both public and private actors.

The ECB has reduced long-term lending rates

Chart 4

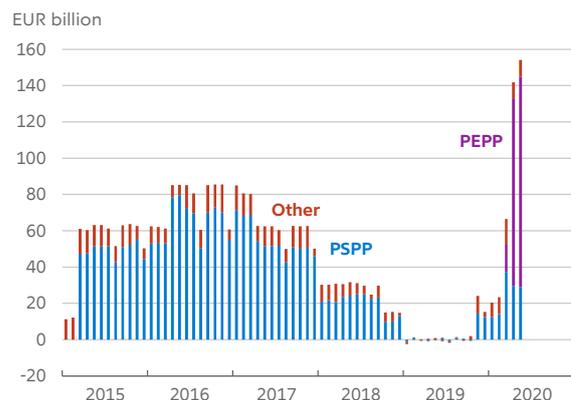


Note: Main refinancing operations (MRO) are secured loans with a maturity of 1 week. PELTRO is a series of extraordinary longer-term refinancing operations maturing in the 3rd quarter of 2021. The interest rate is set ex-post at 25 basis points below the average MRO rate. The TILTRO-III rate depends on banks' new lending to non-financial corporations and households. The interest rate is set ex-post and may not exceed 50 basis points below the average MRO rate and at least 50 basis points below the average deposit rate. The interest rates in the chart are based on current interest rates. Changes follow the time of announcement.

Source: ECB and own calculations.

PEPP significantly increases ECB purchases

Chart 5



Note: Total net asset purchases.

Source: ECB.

contributed to alleviating the financial market turmoil in March.

**The money market spread to the euro area has widened in line with the monetary policy spread**

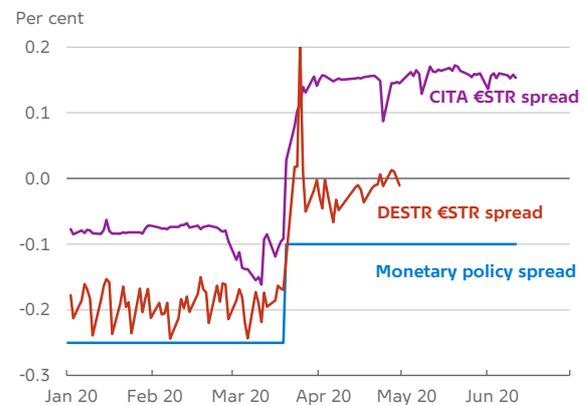
The short-term unsecured deposit rate in the European money market (€STR) has remained largely unchanged during the COVID-19 pandemic. The increase in the benchmark Danish money market rate, expressed here as the 1-month Cita swap rate, has therefore been almost completely passed through to the money market spread, which has widened by 25 basis points since the interest rate increase in March, see Chart 6. Consequently, the now positive money market spread has increased more than what the narrowing of the monetary policy spread by 15 basis points suggests. The (additional) widening by 10 basis points is due to the Cita swap rate being based on the T/N rate, while €STR is based on O/N deposits, see above. Conversely, the money market spread between DESTR and €STR has risen by only 15 basis points, in line with the increase in the monetary policy spread.

**Not clear how COVID-19 has affected real interest rates**

COVID-19 could affect real interest rates and the natural real interest rate, but the exact effect is still to be determined. The lock-down and changed behaviour have contributed to the decline in actual inflation in both Denmark and the euro area.<sup>12</sup> In parallel, financial market expectations to inflation in the euro area have fallen, see Chart 7. The expected inflation is measured by inflation swaps, which are financial products linked to expected inflation. Inflation expectations are generally uncertain, making it difficult to assess whether COVID-19 will impact inflation negatively or positively going forward.

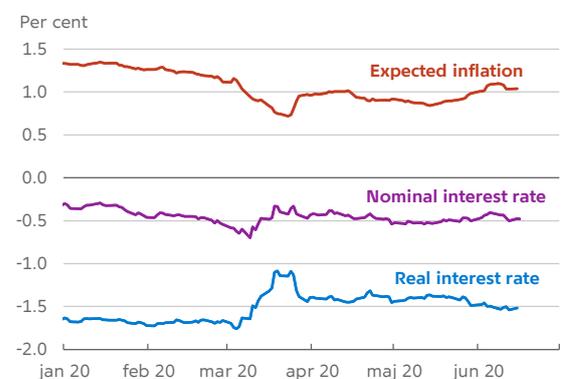
Defining the real interest rate as the nominal interest rate subtracted expected inflation based on inflation swaps, the lower inflation expectations have increased the real interest rate in the euro area since March. Real interest rates can be measured in numerous ways, making the exact impact inconclusive.

**Money market spread to the euro area has increased** Chart 6



Note: Cita-€STR spread is the difference between a 1-month Cita swap rate and the euro short-term rate (€STR). The DESTR-€STR spread is the difference between Denmark Short-Term Rate (DESTR) and €STR.  
 Source: Refinitiv Datastream and ECB.

**The outbreak of COVID-19 has increased real interest rates in the euro area** Chart 7



Note: Expected inflation is based on five to five-year inflation swaps. The nominal interest rate is based on the development in a 5-year OIS (overnight index swap) that reflects the outlook for overnight interest rates in the euro area over the five years.  
 Source: Refinitiv Eikon.

<sup>12</sup> See Danmarks Nationalbank, Prospects of gradual economic recovery, Outlook for the Danish economy, *Danmarks Nationalbank Analysis*, No. 12, June 2020.

The Danish real interest rate<sup>13</sup> is expected to follow the euro area due to the fixed exchange rate regime, and hence it is assessed to be higher than pre-COVID-19.

The outbreak of COVID-19 could also have affected the natural level of the real interest rate, measured by the natural real interest rate.<sup>14</sup> At this level, the actual real interest rate neither stimulates nor tightens economic activity. Consequently, a change in the natural real interest rate will have a forward-looking effect on financial conditions.<sup>15</sup>

For a small open economy such as Denmark, natural real interest rates are particularly affected by persistent changes in savings and investments globally.<sup>16</sup> Effects of the COVID-19 crisis could move in both directions. A strong global need for sovereign debt issuance can, on one hand, have an upside effect on natural real interest rates across countries, including Denmark. This is due to the issuing of government bonds implies less public savings, and simultaneously it increases the supply of financial assets, which global investors have preferred in recent decades.<sup>17</sup>

On the other hand, lower economic growth could put downward pressure on the natural real interest rate. Precautionary motives due to the crisis would have a similar effect, since it increases global savings and lowers real investments. Hence, the ambiguous effects imply that the overall impact on the natural real rate is equivocal.

## Bond markets

### Fluctuations in yields on government and mortgage bonds

Global bond markets have been experiencing large fluctuations in recent months. The outbreak of COVID-19 initially triggered a fall in both mortgage and government rates in all maturity segments at the beginning of March, see Chart 8. This reflected primarily greater demand for safe assets, driven by increased uncertainty about the impact of COVID-19 on the global economy.<sup>18</sup>

### Higher liquidity premiums led to higher government and mortgage rates in March

Yields on both mortgage and government bonds began to rise significantly in mid-March, rising by 75-90 basis points in two weeks. The increase in rates primarily reflected higher liquidity premiums, mainly driven by a global demand for liquidity in major safe currencies such as the US dollar, see the section *Krone demand and foreign exchange markets*. This effect usually occurs during considerable financial turmoil and played also a role during the financial crisis.

The decrease in market liquidity in the Danish mortgage and government bond markets can be illustrated by e.g. considerable widening of the bid-ask spreads on the days when market liquidity was at its lowest, see Chart 9.

Market liquidity may be linked to mortgage yields using the option-adjusted spread (OAS), which can be interpreted as liquidity and credit premiums on callable bonds.<sup>19</sup> During the days when market liquidity was at its lowest (and the bid-ask spread at

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13 The Danish real interest rate is not reported, since there does not exist corresponding liquid products for inflation swaps in Denmark.

14 The natural real interest rate indicates interest rate equilibrium in the economy. This means a measure of the expected direction of real interest rates in the medium to long term, given demand and supply of savings and investment.

15 A fall (an increase) in the natural real interest rate will involve a tightening (easing) of financial conditions at an unchanged level of actual real interest rates.

16 See Adolfsen and Pedersen, The natural real interest rate in Denmark has declined, Danmarks Nationalbank Analysis, no. 13, June 2019.

17 See for instance Del Negro et al, 2017, Safety, Liquidity, and the Natural Rate of Interest, Brookings Papers on Economic Activity, Spring.

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18 Both Danish government and mortgage bonds are, among other things, safe assets, as they have the highest credit rating (AAA).

19 The option-adjusted spread reflects the difference between the observed price and the theoretical price based on the cash flow of a callable bond relative to the swap curve adjusted for the price of the borrower's right to repay the loan at par.

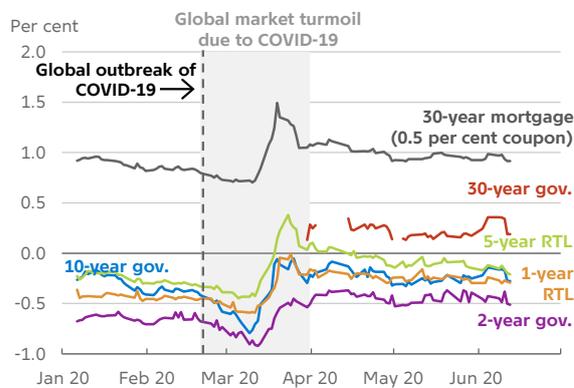
its peak), significant OAS expansions were observed, see Chart 10 (left). This may indicate that higher liquidity premiums contributed significantly to the increase in mortgage yields in mid-March.

**Higher interest rate volatility also contributed to temporarily higher mortgage yields**

Yields on callable mortgage bonds also depend on refinancing premiums reflecting the risk of the borrower exercising his right to repay the loan at par (price 100). The refinancing premium depends on several parameters, including expected interest rate volatility, which typically plays a major role during substantial market turmoil. The expected volatility increased significantly during the market turmoil in March, contributing to the increase in mortgage yields, see Chart 10.<sup>20</sup> This reflects that higher expected interest rate volatility increases the value of the refinancing premium, as investors need to be compensated for greater uncertainty associated with larger refinancing risks.<sup>21</sup>

**Outbreak of COVID-19 increased volatility in the Danish bond market**

Chart 8



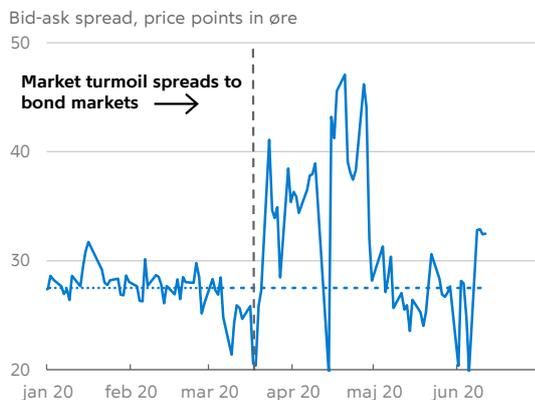
Note: Yields to maturity. Government bond yields are based on Danish on-the-run government bonds maturing in 2025, 2029 and 2052. The 30-year mortgage bond is a Nykredit bond with a 0.5 coupon, maturing in 2050.

Source: Refinitiv Eikon.

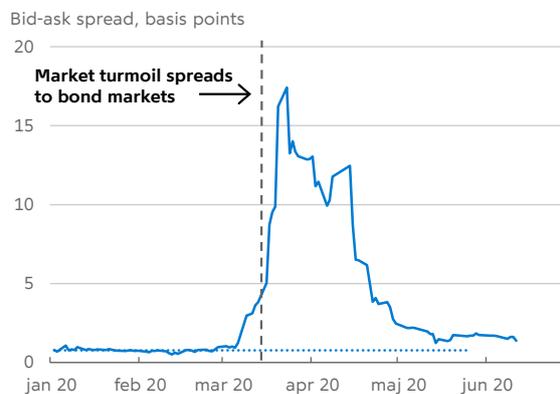
**Marked widening of bid-ask spreads**

Chart 9

**Bid-ask spread on mortgage bonds**



**Bid-ask spread on government bonds**

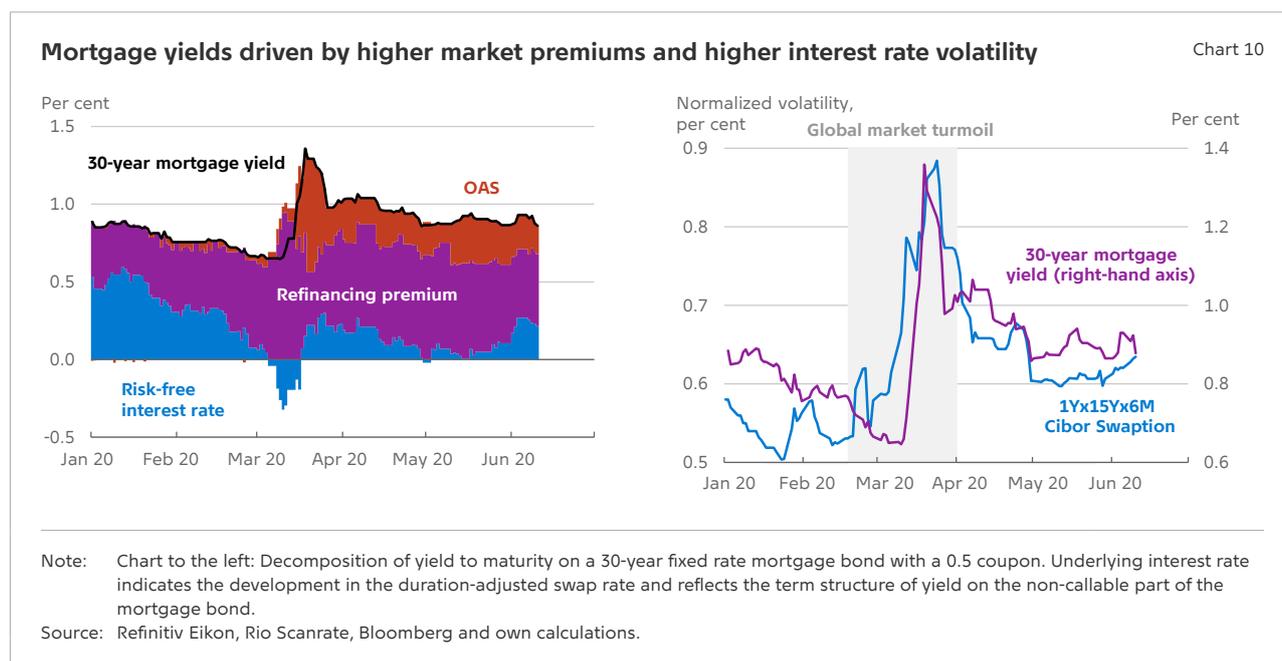


Note: Chart to the left: The bid-ask spread is calculated as the difference in price points in øre between the maximum bid price and the minimum ask price based on prices quoted by Danske Bank, Jyske Bank, Nordea Danmark and Nykredit. Daily average calculated on the basis of bid-ask spreads in the hourly interval 10-16 on trading days. Chart to the right: The bid-ask spread is calculated as the difference in basis points between minimum ask price and maximum bid price based on quoted prices, based on a weighted average of the bonds: 0.25 per cent 15-11-2022, 1.75 per cent 15-11-2025, 0.50 per cent 15-11-2029 and 4.50 per cent 15-11-2039.

Source: Danmarks Nationalbank, Refinitiv Eikon, Scanrate RIO and own calculations

20 Since the call option on mortgage bonds is not market-based, it is not explicitly priced. As a consequence, swaptions (ATM options on interest rate swaps) are typically used in practice as a proxy for expected volatility.

21 Expected volatility may well be priced via OAS as OAS may depend on the volatility in the underlying pricing model.



**Normalisation of liquidity premia has contributed to lower market yields in recent months**

In the wake of the global market turmoil in March, mortgage yields have fallen back in recent months, driven primarily by an OAS narrowing due to gradual normalisation of market liquidity. Government bond yields have also fallen back to roughly the level before the COVID-19 crisis.

**Foreign investors bought Danish mortgage bonds despite market flight to major currencies**

Foreign investors make up approximately 35 per cent of the investor segment for callable Danish mortgage bonds, meaning that they play an important role in the transmission of monetary policy to Danish mortgage yields.

Foreign investors bought callable mortgage bonds in March (net) for just under kr. 20 billion. The continued interest among foreign investors should be viewed in the light of the strong increases in, inter alia, liquidity premiums, which underpinned Danish mortgage yields relative to the few alternatives with a high credit rating and long maturity, see Box 2.

For a long period, foreign investors have preferred on-the-run fixed-rate mortgage bonds. The continued demand for callable mortgage bonds after the outbreak of COVID-19 has been supported by the behaviour of foreign investors at redemption. The reason is that investors whose mortgage bonds are redeemed may choose to either buy new issuances or invest their liquidity elsewhere, for instance in another currency. Foreign investors have largely chosen to reinvest in newly issued low coupon bonds after redemption, see Chart 11.<sup>22</sup>

**Interest rates spreads between Danish and German government bonds have increased**

The 2- and 10-year government bond spread between Denmark and Germany has increased, see chart 12. Particularly, the 2-year spread was affected by Danmarks Nationalbank's interest increase by 15 basis points during March. Larger liquidity premiums on Danish government bonds compared to German counterparts also contributed to the increase. This may reflect that the pass-through of ECB's PEPP on Danish government bonds has been modest, at least in the short-run. In recent months the spreads have narrowed back, reflected falling liquidity premiums.

<sup>22</sup> Their redemption covers redemption of their existing bonds at the April pay date and the expected redemption at the upcoming July pay date.

**Danish mortgage bonds remain attractive to foreign investors despite the COVID-19 crisis**

Box 2

The outstanding volume of Danish fixed rate mortgage bonds has increased by approximately kr. 400 billion since 2016. Foreign investors accounted for approximately kr. 270 billion of the net purchases, equivalent to 65 per cent, see Chart A. The US, European and Japanese investors buy far the largest share. Japanese investors, in particular, have played an important role in terms of foreign investors' increasing holdings of Danish fixed rate mortgage bonds in recent years.

Net surplus in Japan has been positive for many years, creating a need among Japanese investors to place liquidity in foreign assets. At the same time, in the high credit rating (AA-AAA) and long maturity segment Japanese investors have not been able to achieve an attractive return in Japanese yen. The main reason is that yields on Japanese government bonds have been around zero per cent p.a. for an extended period.

**Outbreak of COVID-19 affected the performance of Danish mortgage bonds to a lesser degree**

To a foreign investor, the return on a Danish mortgage bond relative to a comparable bond depends on the difference in the slope of the yield curves in Danish kroner and foreign currency, respectively. The reason is that the short end of the yield curve reflects the price of hedging while the long end reflects the non-hedged difference in returns on the bonds to be compared.

To a Japanese investor, the global market turmoil in March entailed a decline of around 100 basis points in the foreign currency-hedged return on Danish callable bonds, see Chart B. This reflected primarily the implication of the increase in expected short-term Danish money market rates, entailing that Japanese investors faced hedging costs rather than hedging gains. The higher hedging costs may have affected the behaviour of some Japanese investors in March. Data from the Japanese Ministry of Finance indicates that Japanese investors did not purchase Danish callable bonds net in March.

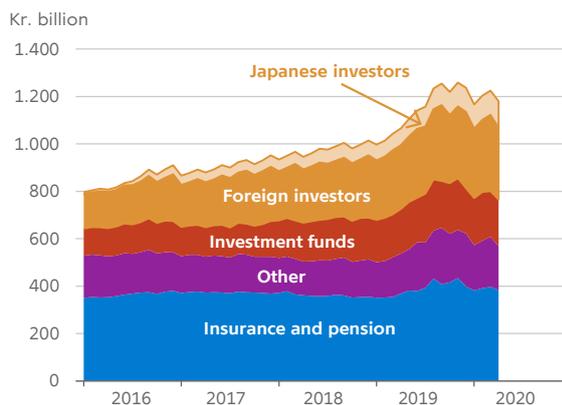
Despite the fall in returns, Danish mortgage bonds still provided better returns than comparable bonds with high credit ratings, see Chart B. This reflects the sharp increase in OAS and also larger expected interest rate volatility.

To both US and European investors, the gains from hedging Danish kroner have fallen as a result of narrowing of the short-term money market spreads.

Despite the falling hedging costs, Danish callable bonds continue to provide a better return for both US and European investors compared with the few other alternatives in the bond segment mentioned earlier. This has maintained foreign investors' interest in Danish mortgage bonds during the COVID-19 crisis.

**Foreign investors play a larger role in the market for callable mortgage bonds**

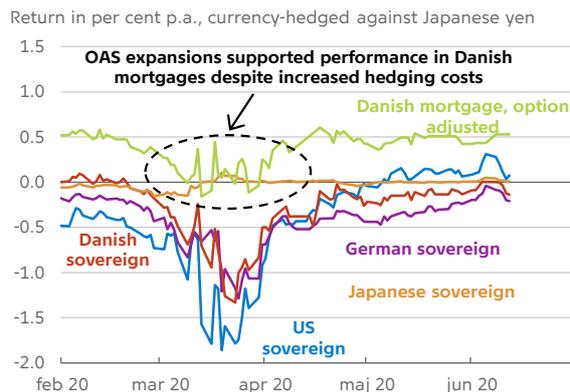
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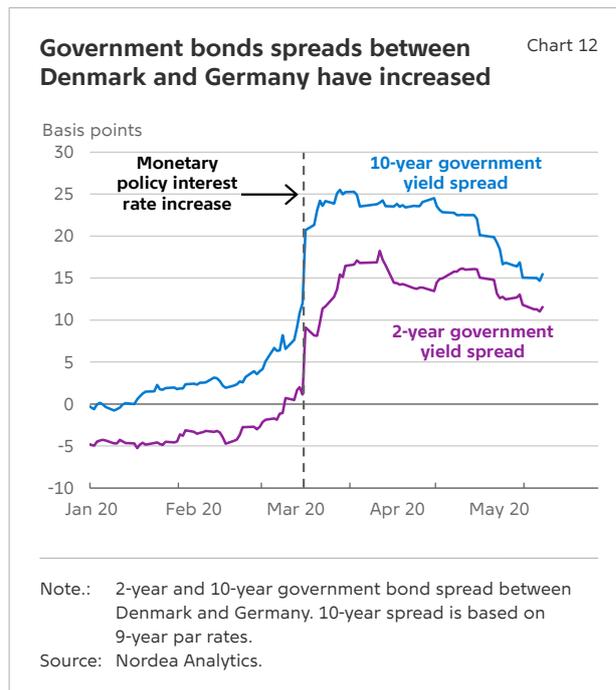
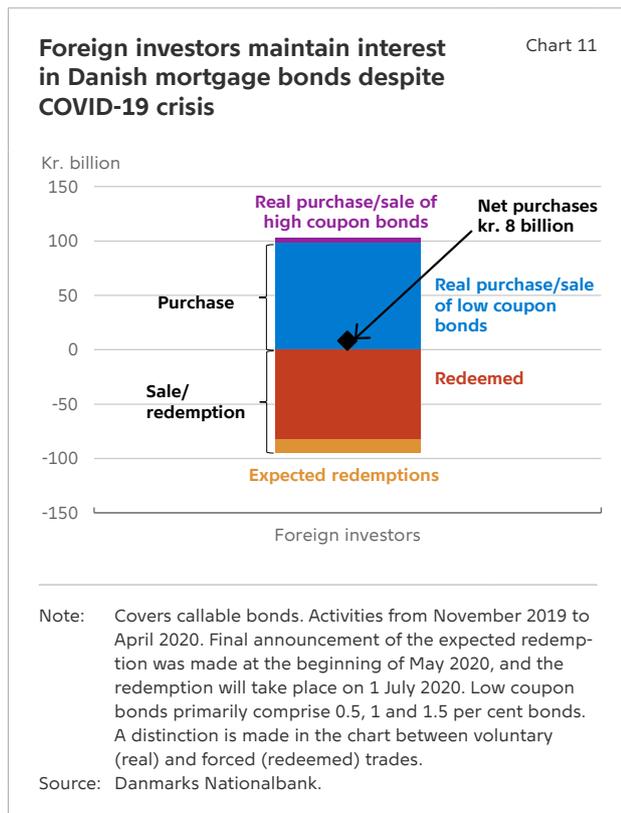
Note: Distribution of owners of all Danish fixed rate mortgage bonds. 'Japanese investors' indicate the total holdings of Danish long-term non-government bonds.  
 Source: Danmarks Nationalbank and Japanese Ministry of Finance.

**Continued performance in Danish mortgage bonds despite COVID-19 crisis**

B



Note: All bond yields have been hedged against Japanese yen via rolled 3-month forward contracts. Government bonds are 10-year on-the-run yields. "Danish mortgage yield" is a 30-year on-the-run bond that disregards the refinancing premium to ensure consistency across coupons and comparison with 10-year government bond yields.  
 Source: Refinitiv Eikon, Rio Scanrate and own calculations.



### The outbreak of COVID-19 substantially increased risk premiums on corporate bonds

The level of risk premiums on Danish corporate bonds has been low in recent years and, unlike equity risk premiums, have not increased since the financial crisis, see the section *Equity markets*.<sup>23</sup>

The outbreak of COVID-19 greatly increased risk premiums on Danish corporate bonds in March, see Chart 13. The sharp increase in risk premia on corporate bonds was also seen in other countries and reflected the fact that investors began to value greater risks on downgradings of corporates' credit rating.

The expansion of the risk premiums on Danish corporate bonds was in the region of 200 basis points, corresponding to the expansion during the financial

crisis. A substantial difference from the financial crisis is that the widening of the corporate bond spread only lasted just under one month, while it lasted seven months during the financial crisis. This reflects that the COVID-19 crisis is initially only a real economy crisis which experienced an immediate liquidity shortage as a result of the lock-down. During the financial crisis, the liquidity challenge arose over a longer period, as it was originating from a banking crisis.

Following the market turmoil in March, the corporate bond spread has fallen back by approximately 100 basis points and is therefore still higher than before the outbreak of COVID-19. The decrease reflects, among other things, the ECB's announcement of PEPP as investors' increased awareness of which industries affected by the COVID-19 crisis.<sup>24</sup> The spread to the euro area has widened slightly since

<sup>23</sup> The risk premium on corporate bonds indicates the additional return required as compensation for investing in a bond rather than a "risk-free" asset with the same maturity, here indicated by a 6-month Euribor swap. All else equal, the risk premium per construction will fall when prices of the underlying assets rise.

<sup>24</sup> Corporations operating in industries such as transport, services and manufacturing are maintaining high spreads, while firms operating in industries where earnings and expected earnings have not been severely affected have normalised to a higher degree.

the introduction of PEPP. This may reflect that in the short term the spillovers from the ECB’s purchases to Danish corporate bonds are modest.

## Equity markets

### COVID-19 has affected equity markets in recent months

In recent months, equity markets have been characterised by a changed risk. Since the global outbreak of COVID-19, the return on Danish equities (OMXC25 CAP) has fallen by a total of 3 per cent, see Chart 14. Danish equities have fallen less than US (S&P 500) and European (Euro Stoxx 600) equities, which have fallen by 9 per cent and 16 per cent, respectively. The background is that the Danish equity market has an overweight of corporations operating with pharmaceuticals and medical equipment, and their equity prices have been far less affected by the COVID-19 crisis than corporations in other industries, see Chart 15 (left).

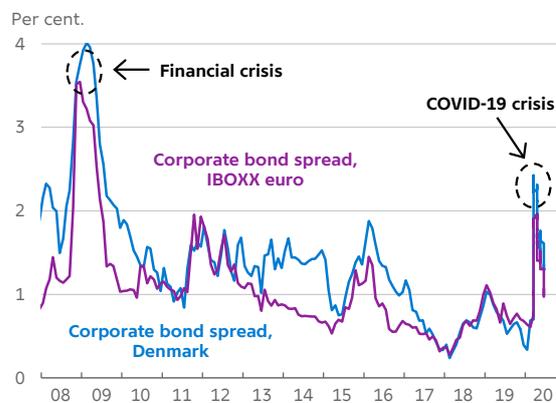
The more moderate equity price falls for pharmaceutical companies have been reflected in e.g. analysts’ earnings expectations, where expectations for these companies are relatively unaffected by the COVID-19 crisis, see Chart 15 (right).

### Equity risk premia and earnings expectations have driven the equity market in recent months

The decline in equities in recent months covers a sharp fall in late February and March, followed by a gradual recovery in recent months. The drop in equities during March was characterised by strong market turmoil. In less than a month, global equities fell 30-40 per cent, and expected volatility was higher than during the financial crisis. The drop in March was generally driven by a significant increase in equity risk premiums<sup>25</sup> along lower earnings expectations, see Chart 16.<sup>26</sup>

### Risk premiums on Danish corporate bonds have increased

Chart 13

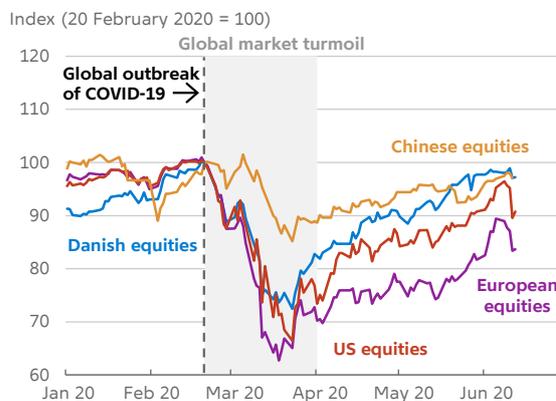


Note: The corporate bond spread is calculated as the yield to maturity less a maturity-adjusted 6-month Euribor swap. The yield to maturity on corporate bonds covers a weighted average of the yields to maturity on the underlying bonds.

Source: Danmarks Nationalbank, Refinitiv Eikon and own calculations.

### Large fluctuations on global equity markets

Chart 14



Note: Total returns, i.e. including dividends distributed. Danish equities are based on OMXC25 CAP, European equities are based on Euro Stoxx 600, US equities are based on S&P 500 and Chinese equities are based on Shanghai Shenzhen CSI 300.

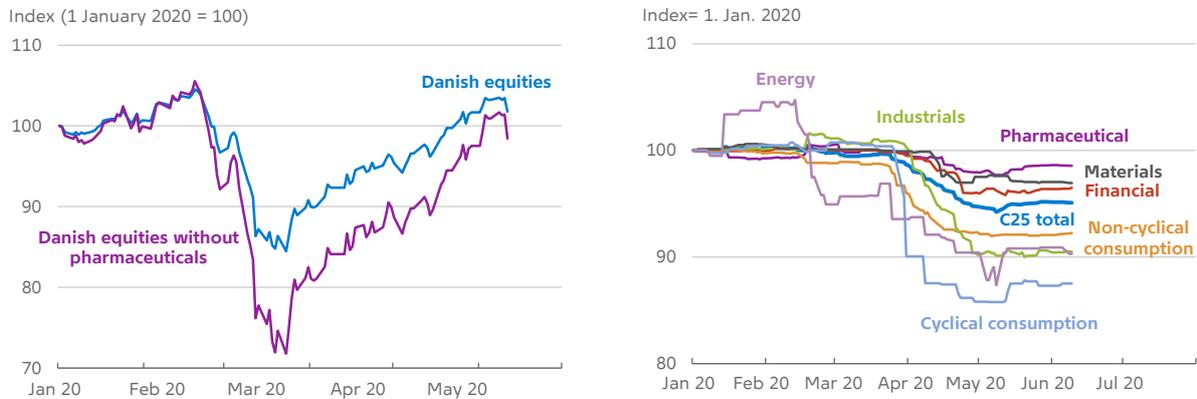
Source: Refinitiv Eikon.

25 The risk premium is a measure of the additional return required as compensation for investing in an equity rather than a “risk-free” asset (bond). All else equal, the equity risk premium will fall when equity prices rise.

26 In Denmark, the equity risk premium has remained fairly unchanged due to the marked weight of the pharmaceutical industry in the stock index.

**The pharmaceutical sector has supported the Danish equity market**

Chart 15



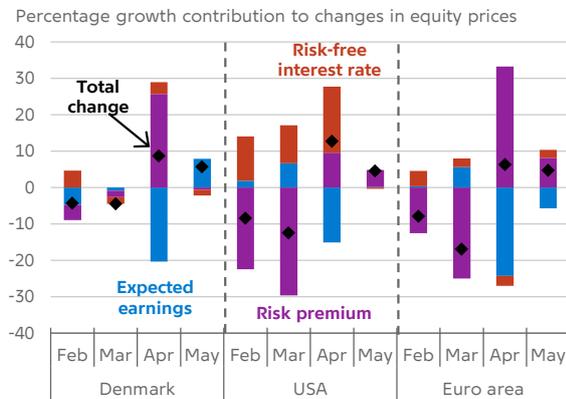
Note: Chart to the left: Based on OMXC25. Pharmaceutical companies include: Ambu, Coloplast, Demant, Genmab, GN Store Nord, Lundbeck and Novo Nordisk. Chart to the right: Based on the corporates revenue expectations in 2020. Financial covers Danske Bank, Jyske Bank, Topdanmark, Tryg and Simcorp. Energy covers Ørsted. Non-cyclical consumption covers Carlsberg, Chr. Hansen and Royal Unibrew, Cyclical consumption covers Pandora. Materials cover Novozymes. Industry covers A.P. Moller Maersk, DSV, FLSmidth, ISS, Rockwool and Vestas.

Source: Refinitiv Datastream, Refinitiv Eikon and own calculations.

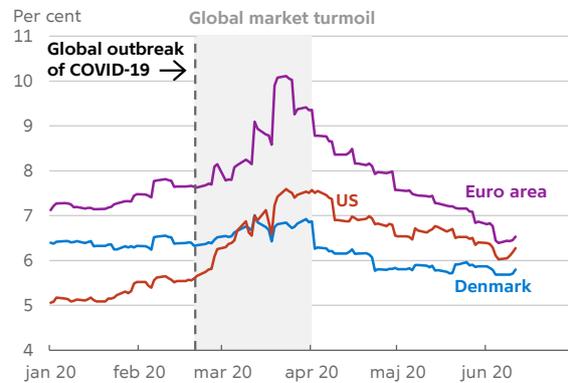
**Fluctuations in equity risk premia and expected earnings have driven the equity market**

Chart 16

**Drivers of equity price development**



**Development in equity risk premia**



Note: Based on OMXC20, Euro Stoxx and S&P 500. Implied future returns have been derived via an approximation to a three-period dividend discount model. Consensus expectations collected from market analysts have been applied as expectations of growth in earnings. A 10-year government bond from the country to which the index relates has been applied as a risk-free asset. For Euro Stoxx, a German 10-year government bond has been used. The decomposition may be uncertain in the short run as data on earnings expectations is not daily updated. Interest rates and equity prices are based on daily data.

Source: Refinitiv Datastream, Refinitiv Eikon and own calculations.

After the equity market bottomed out at the end of March, global equity prices have risen 20-30 per cent. This increase reflects, inter alia, a strong drop in equity risk premia due to greater clarity on the economic outlook. In the USA, the significant fall in interest rates has also supported equity price developments.

### The COVID-19 crisis has led to increased differences in expected earnings across industries

Looking ahead, uncertainty about the duration of the lock-down period and the resulting economic effects may lead to more pronounced uncertainty about expected earnings than usual. This reflects, inter alia, many corporates decisions to postpone or suspend their earnings estimates for the remainder of the year.

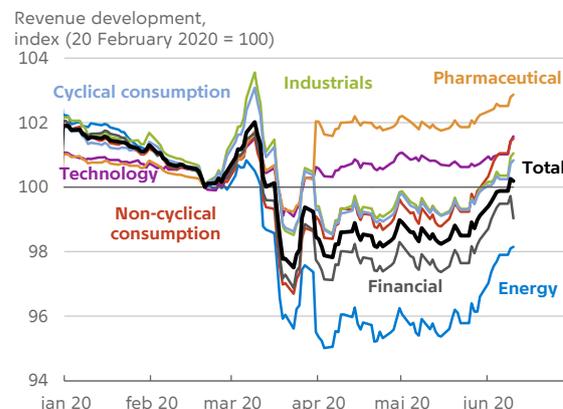
Earnings expectations for the rest of 2020 are significantly lower than for the first accounting season during the COVID-19 crisis, while expectations for 2021 are less affected by the COVID-19 crisis. This reflects, among other things, equity market expectations of a relatively rapid return of economic activity.

Another factor that has also affected equity market developments is investors' increased awareness of which industries' expected earnings that have been affected by the COVID-19 crisis. So far, revenue in industries such as technology and pharmaceuticals has not been affected by the COVID-19 crisis to any great extent (some industries actually benefit from it), see Chart 17. This reflects the fact that these industries are not particularly sensitive to a lock-down situation. Earnings expectations for these industries are also less affected by the COVID-19 crisis compared to industries such as energy, finance and manufacturing. This may reflect that increased digitisation can redistribute market shares and open up new markets.

Since these industries make up around 30 per cent of the global equity market, they have helped to support equity market developments.

### Some firms are not affected by COVID-19

Chart 17



Note: Global revenue in listed companies across industries.  
Source: Refinitiv Datastream.

### Equity risk premia have been at a high level for a relatively long period

Equity price developments have a major impact on the financing costs of firms via equity issuance. Equity risk premiums remain historically high, although they have fallen since mid-March. Since before the financial crisis, investors have required a largely unchanged return on equity, despite the strong drop in risk-free interest rates.<sup>27</sup> Consequently, the risk premium on Danish equities has increased from 3-4 per cent to 6-7 per cent. Developments in the euro area and to some extent in the USA have been similar.

According to a Economic Memo, the increase in the equity risk premium does not directly reflect a higher risk, but rather financial frictions and changed financial behaviour.<sup>28</sup> The high equity risk premium has therefore contributed to making financing through equity issuance relatively more expensive compared with debt financing.

27 Danmarks Nationalbank, Decline in interest rates and refinancing boom, *Danmarks Nationalbank Analysis (Monetary and financial trends)*, No. 19, September 2019.

28 Søren Lejsgaard Autrup and Jonas Ladegaard Hensch, Do equity prices reflect the low interest rate environment?, *Danmarks Nationalbank Economic Memo*, No. 1, February 2020.

Naturally, the outbreak of COVID-19 led to higher short-term risks, which was indeed reflected in higher risk premia and falling equity prices in March. However, this has not changed the fact that equity risk premiums remain at a high level in relation to underlying risk development.

## Credit and money

### Lower interest rates supported credit growth in the run-up to the COVID-19 crisis

Total annual growth in credit to households and corporations increased to 2.3 per cent in April, see Chart 18. In the past year, credit growth has been increasing, and before the COVID-19 outbreak it was at the highest level since the financial crisis. This was supported by, inter alia, the low level of interest rates and the historical wave of refinancing.<sup>29</sup> However, credit growth remained relatively subdued going into the COVID-19 crisis, given that the economy was in a moderate upswing.

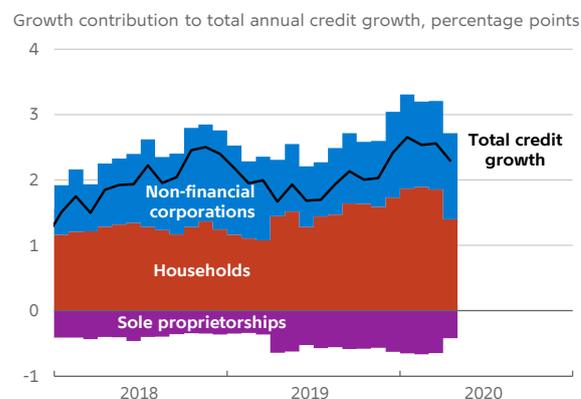
Overall, both corporations and firms have increased their robustness since the financial crisis, such that their financial position was stronger before the outbreak of COVID-19. Household debt was going into the financial crisis on a higher level than developments in economic fundamentals, like structural income, interest rates and wealth would argue. In contrast to the financial crisis, households' debt is after 12 years consolidation in line with economic fundamentals.<sup>30</sup>

### So far, overall credit growth has been unaffected by the COVID-19 crisis

Overall, the COVID-19 crisis has not led to a change in credit growth so far. However, the composition of loan demand has changed so that, to a higher degree than during the upswing has been driven by corporate demand for credit rather than household mortgages for housing transactions and refinancing.

**Rising credit growth in the year up to the COVID-19 crisis**

Chart 18



Note: Lending by banks and mortgage institutions in all currencies to individuals and entities resident in Denmark. Households comprise employees and pensioners etc.  
 Source: Danmarks Nationalbank.

Total net lending by banks to corporates increased by kr. 6.1 billion from February to April, corresponding to 1.7 per cent. The change covers two potentially contradictory effects. On the one hand, given their fears of slowdown due to the lock-down, corporations have aimed for higher liquidity buffers, contributing to higher lending. On the other hand, corporations have, overall, been reluctant to invest because of larger economic uncertainty, which may have had a downside effect on net lending. The loan figures are based on Danmarks Nationalbank's MFI statistics, which only include utilised credits. This means that unutilised agreed credit lines, e.g. overdrafts or other kinds of already agreed credit commitments, are not included as long as corporations have not used them.

Up to and including 25 May, the two public funds, the Danish Export Credit Agency (EKF) and Vækstfonden, provided loan guarantees amounting to kr. 3.2 billion to corporations through their COVID-19

<sup>29</sup> At the mortgage pay dates on 1 July 2019, 1 October 2019 and 1 January 2020, fixed rate mortgages were refinanced for a historical amount of kr. 477 billion. The refinancing volume is both the largest in nominal terms and the largest share of redeemed mortgage debt in the history of the statistics.

<sup>30</sup> See Alexander Meldgaard Otte and Ianna Georgieva Yordanova, Household debt reflects economic conditions, *Danmarks Nationalbank Analysis*, forthcoming 2020.

schemes. Lending mainly takes place through the banks, which is why it is covered by the lending figure, but may, conversely, have contributed to credit that would not otherwise have taken place. Additional public actions as the postponement of tax and VAT payments may have discharged liquidity on corporations' balance sheets and thereby contributed to a more subdued credit growth.

Despite the relatively limited actual lending growth, intermediation activity has been at a high level, enabling some corporates to renegotiate their loan terms against the background of COVID-19. This may indicate corporates' initial intentions of increasing their liquidity reserves beyond what they have accumulated in recent years, but there are no indications yet of this in overall lending to corporates. In contrast, European firms increased borrowing by 3.8 per cent in April.

Corporations' desire to build up liquidity may also be reflected in their bank deposits, which rose by kr. 6 billion from February to April, adjusted for seasonal effects. The higher deposits may also be attributable to the deferral of VAT payments, reduced economic activity and supported by some banks' temporary suspension of negative deposit rates for certain industries.

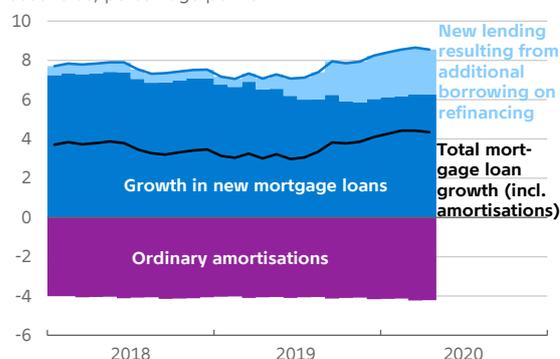
### Higher interest rates and lower housing market activity have dampened mortgage growth

As mentioned above, an increase in household mortgages has made a significant contribution to the past year's rise in credit growth, see Chart 19. This covers especially additional borrowing on refinancing<sup>31</sup>, estimated to have increased household fixed rate mortgage debt by at least<sup>32</sup> kr. 36 billion over the past year.<sup>33</sup>

### Mortgage lending pushed up by additional borrowing on refinancing

Chart 19

Contribution to annual growth in mortgage lending to households, percentage points



Note: Loans in nominal terms. The contribution from additional borrowing on refinancing is a low side estimate, see footnote 32. Overall growth in mortgage lending reflects the volume of new lending less ordinary amortisations.  
 Source: Danmarks Nationalbank and calculations based on the Land Registry.

In recent months, mortgage growth has slowed slightly as a result of a lower extent of refinancing. Mortgage terminations are expected to be in the range of kr. 33.5 billion for the July date of payment, indicating an end to the refinancing boom. Among other things, this has been a consequence of the increased economic uncertainty and global search for liquidity during March, which contributed to a temporary increase in Danish mortgage yields. At the same time, the fact that many mortgages have already been refinanced during the refinancing boom over the past year has had a dampening effect on termination, as relatively fewer loans were eligible for refinancing.

31 Calculations are made on the background of Land Registry data. Refinancing has been calculated as the refinancing of loans to lower fixed rate loans without buying or selling a home. Additional borrowing based on home equity on refinancing has been calculated as the difference between the principal of the old loan and the new loan, if that difference exceeds 5 per cent. It is thus assumed that actual additional loans are characterised by being larger than the amount required to just cover transaction costs and any capital loss. The calculation is subject to uncertainty.

32 It is a low side estimate of additional borrowing on refinancing, as borrowing against home equity resulting from current amortisations cannot be taken into account.

33 See Henrik Yde Andersen, Stine Ludvig Bech, Ida Rommedahl Julin and Alexander Meldgaard Otte, Mortgage refinancing supports private consumption, *Danmarks Nationalbank Analysis*, No. 17, September 2019.

Although mortgage yields have risen, the pass-through to homeowners' realised borrowing costs has been limited. This is partly because many homeowners hedged prices on their mortgage loans before the COVID-19 outbreak. In addition, households and corporations benefited from the fact that the auctions on interest rate adjustment related to the April pay date, when a relatively large proportion of the loans were to be refinanced, were held at the end of February and thus before the interest rate increases took place.<sup>34</sup>

In addition to the increase in interest rates, the COVID-19 crisis has also impacted borrowing activity through reduced activity in the housing market. Developments in the number of newly registered deeds and mortgage deeds<sup>35</sup> points to a decline in borrowing activity in April and May, see Chart 20.

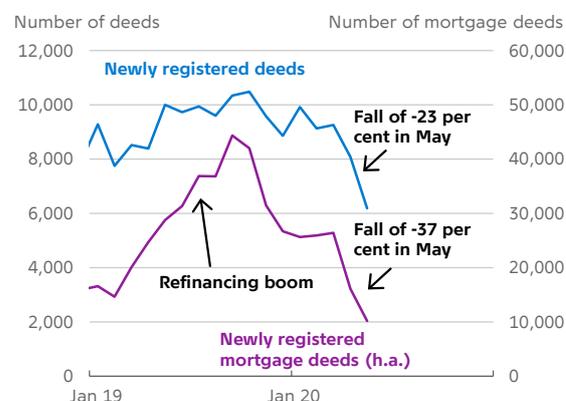
The development clearly reflects the lagged effect of low housing market activity in March and in the first two weeks of April.<sup>36</sup> Although the housing market has recovered, the lower number of registrations may dampen mortgage growth in the coming months.<sup>37</sup>

### Danish banks maintain unchanged credit standards despite COVID-19 crisis

In the euro area, there are signs that banks initially tightened credit standards a little at the outbreak of the COVID-19 crisis.<sup>38</sup> But in Denmark, credit standards have remained largely unchanged for the

**Lower housing market activity as a result of the outbreak of the COVID-19 crisis**

Chart 20



Note: The indicators are based on registrations of loans to households in the Land Registry. The registrations occur after the loan contract is signed and before moving in if a housing transaction is involved. Percentage monthly changes specified in the chart.

Source: Danmarks Nationalbank.

<sup>34</sup> At the auctions on interest rate adjustment for the July pay date, kr. 16 billion was offered, distributed on 1-, 3- and 5-year adjustable rate loans. Interest rate levels were higher for the July pay date compared with the April pay date, but the auction was relatively small with a low refinancing rate of 62 per cent.

<sup>35</sup> Registrations in the Land Registry provide early insight into the number of newly registered deeds and mortgage deeds. The deeds only illuminate housing market activity, while mortgage deeds include changes in household risk profiles and refinancing activity.

<sup>36</sup> Registrations of deeds and mortgage deeds do not occur automatically and are associated with a natural time lag relative to actual housing market transactions.

<sup>37</sup> See Danmarks Nationalbank, Prospects of gradual economic recovery, Outlook for the Danish economy, *Danmarks Nationalbank Analysis*, No. 12, June 2020.

<sup>38</sup> See European Central Bank, 2020, The euro area bank lending survey – First quarter of 2020. The survey included 144 banks with a response rate of 99 per cent. 4 per cent of the respondent banks reported credit standard tightening, relative to 1 per cent in the 1st quarter of 2019. However, banks expect easing going forward.

banking sector as a whole.<sup>39</sup> Timely corporation aid and the release of the countercyclical capital buffer are likely to have supported the lending capacity of banks. The expanded credit lines and renegotiated loan terms can help corporations get through the crisis more safely. In addition, the average interest rate on new lending to non-financial corporations remained broadly unchanged in April, see Chart 21.

### Banks have introduced negative deposit rates for wealthy households

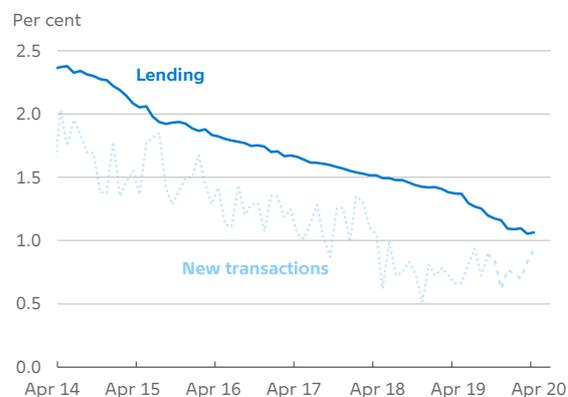
Negative deposit rates have now also been introduced for wealthy households. Since December last year, when Jyske Bank introduced negative interest rates for specific household deposits, several other banks have followed suit. Negative deposit rates were introduced for non-financial corporations in 2015, and the share of comprised corporate customers has increased gradually since then. Currently, approximately 5 per cent of household deposits have negative interest rates, compared with 75-80 per cent for non-financial corporations.

Overall, negative deposit rates have not given rise to extraordinarily low demand for deposits. Since 2015, the development in corporate and household deposits has been in line with what could be expected from the economic fundamentals, see Chart 22. Deposits have increased as a result of higher incomes and housing wealth that can be liquidated. In addition, lower returns on safe alternatives, such as 10-year government bonds compared to deposit rates has also contributed to increasing deposits.

Moreover, a search for liquidity resulting from the COVID-19 crisis may entail increased cash demand. However, there is no sign of this in Denmark, unlike the euro area, where the crisis has given rise to increased demand for cash. This should be viewed in the light of such factors as the far higher prevalence of digital payments in Denmark relative to the euro area.

### Corporate lending rates have been unchanged

Chart 21

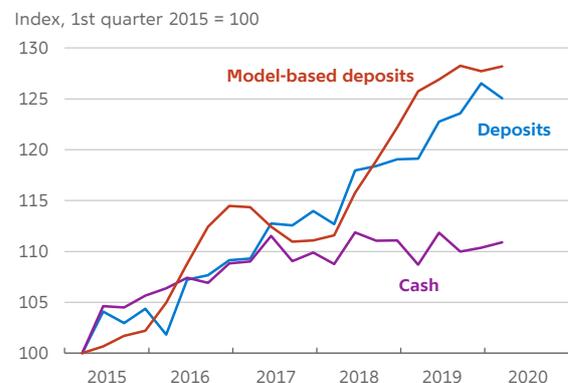


Note: Average interest rate on all outstanding loans in Danish kroner for non-financial corporations, as well as interest on new lending transactions. New transactions exclude overdrafts and cover new and actively renegotiated loans.

Source: Danmarks Nationalbank.

### Development in deposits is in line with economic fundamentals

Chart 22



Note: 'Deposits' cover all deposits in banks of both households and non-financial corporations. Model-based deposits cover total deposits from households and corporates and are based on Jonas Ladegaard Hensch, A new model for money demand in Denmark: Money demand in a negative interest rate environment, 2019.

Source: Danmarks Nationalbank and calculations based on Hensch (2019).

<sup>39</sup> Danmarks Nationalbank's lending survey for the 1st quarter shows that banks expected higher loan demand from non-financial corporations in the 2nd quarter. At the same time, they report unchanged credit standards.

## Krone demand and foreign exchange markets

### The krone strengthened after interest rate change in mid-March

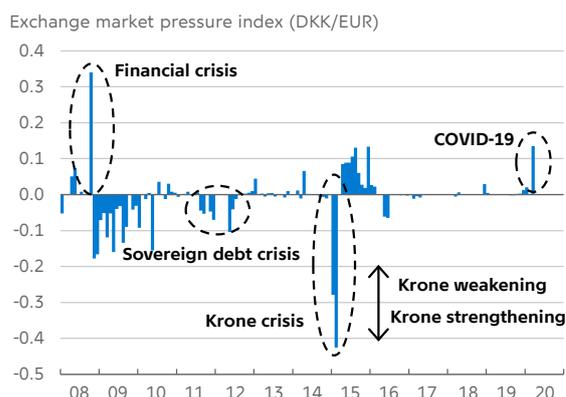
In relation to the financial market turmoil in March, the krone was under pressure to weaken. The pressure meant that Danmarks Nationalbank intervened in the foreign exchange market and sold foreign exchange for kr. 65 billion in March. This amount was higher than the largest monthly sales of foreign exchange during the financial crisis in October 2008.

Exchange rate pressures can be measured through interventions, interest rate changes or exchange rate changes. In order to assess exchange rate pressures over time and in different exchange rate regimes, all three channels must be taken into account. This can be done by applying Exchange Market Pressure (EMP) indices, weighting exchange rate developments, foreign exchange interventions and interest rate changes. There are many different EMP indices. The EMP index of Goldberg and Krogstrup (2019)<sup>40</sup> shows that the pressure in relation to the outbreak of COVID-19 constitutes the strongest pressure towards a weakening since the financial crisis, and that the pressure came after several years of exchange rate stability, see Chart 23.<sup>41</sup> Since the financial crisis, the krone has also come under pressure towards strengthening on two occasions: the sovereign debt crisis and the reverse krone crisis at the beginning of 2015.

The krone's exchange rate against the euro has strengthened slightly in recent months and is close to its central rate, see Chart 24. Danmarks Nationalbank has not intervened in the foreign exchange market since March. The foreign exchange reserve amounted to kr. 455.8 billion at the end of May and has increased in recent months. This reflects government borrowing in foreign currencies.

### Strong weakening pressure on the krone in connection with COVID-19

Chart 23

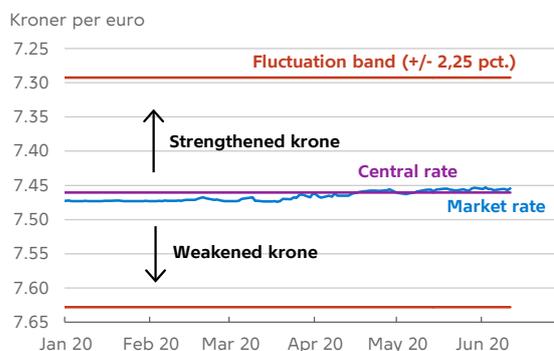


Note: There are several versions of the Exchange Market Pressure (EMP) index. This chart is based on the Goldberg and Krogstrup (2019) EMP index.

Source: Goldberg and Krogstrup (2019) and own calculations.

### The krone has strengthened slightly

Chart 24



Note: Exchange rate of the krone vis-à-vis the euro. Reverse scale.

Source: Refinitiv Datastream.

<sup>40</sup> Linda Goldberg og Signe Krogstrup, International Capital Flow Pressures, *Federal Reserve Bank of New York Staff Reports*, no. 834, February 2018; revised September 2019.

<sup>41</sup> EMP cannot reveal underlying motives for foreign exchange interventions. The strengthening pressure in 2009 and weakening pressure in the second half of 2015 are due to the normalisation of the foreign exchange reserve after the financial crisis and the reverse krone crisis, respectively.

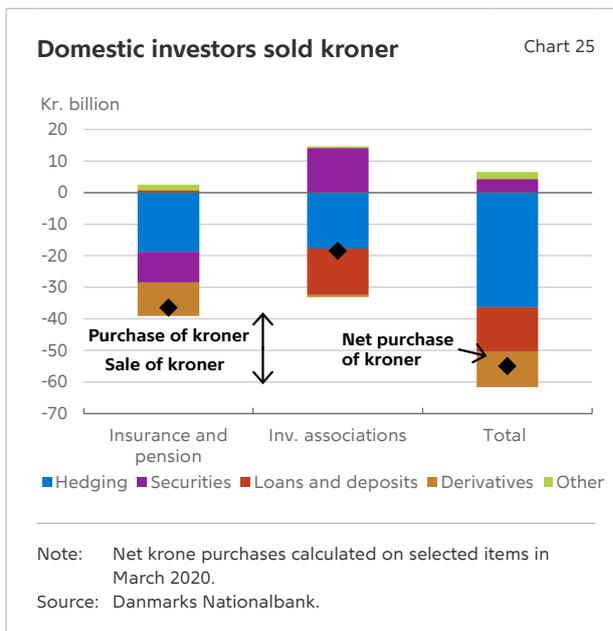
### Downward krone pressure was due to domestic investors' sales of kroner

Much of the krone pressure in March was due to Danish institutional investors' sales of kroner. Danish insurance and pension companies and investment funds sold kroner for a net amount of kr. 55 billion in March, see Chart 25. Foreign investors continued to show interest in Danish securities, including mortgage bonds (see above), which contributed to an increase in the krone demand.

The (net) krone sales by domestic investors largely reflect their reduction of foreign currency hedging by approximately kr. 36 billion in March, see Chart 25. This is related, inter alia, to the substantial falls in both equity and bond prices during March. The fall in foreign currency hedging largely reflected lower dollar hedging in the insurance and pension sector. In isolation, it contributed to a krone sale of kr. 61 billion, see Box 3. However, the lower dollar hedging was partially offset by higher hedging of euro against kroner, which, in isolation, increased krone demand. An increase in euro hedging may be associated with uncertainty about the outlook for fiscal imbalances in few euro area member states. In addition, the cost of hedging euro through forward contracts has decreased.

### Margin calls also affected krone demand during financial turmoil

For derivative contracts, daily collateral is typically required in order to offset daily fluctuations in prices. This applies both to listed<sup>42</sup> derivatives and to certain standardised over-the-counter (OTC) derivative contracts, where contracts are required to be cleared via a central clearing partner. Central clearing requires collateral in the form of cash deposits. As a result of fluctuations in prices on listed derivative contracts (e.g. equity futures), the insurance and pension sector had to provide collateral for kr. 11 billion in March. For derivative contracts, the collateral is provided in the same currency as the underlying asset, and since the majority of the listed derivatives are in foreign currency, foreign currency collateral was provided in March. The loss on the listed derivatives therefore resulted in krone sales of kr. 11 billion, see Chart 25.



Overall, global price falls, particularly on equities, played a large role during the krone pressure in March. The krone market has calmed down as global financial markets have stabilised.

### Increased market turmoil created strong demand for US dollars

At the peak of the market turmoil in March, a dollar shortage arose. This can be illustrated by e.g. expansions of the covered interest rate parity between currency pairs.

The expansions of the covered interest rate parity between the dollar and the krone, as well as a number of other key currencies, such as the euro and the Japanese yen, were quite significant in mid-March, see Chart 26. The expansions made it more expensive to buy dollars in the foreign exchange market than in the US money market. This reflects the fact that investors without access to the US money market were short of dollars. The strong dollar demand also prompted many central banks, including Danmarks Nationalbank, to enter into swap agreements with the Fed to ensure dollar liquidity for their respective money markets. At the end of April, Danmarks Nationalbank had outstanding US dollar loans for USD 6.3 billion.

42 Listed means exchange traded derivatives.

### Dollar hedging in the insurance and pension sector affected the krone rate during financial turmoil in March

Box 3

At the end of February, the insurance and pension sector had dollar assets worth approximately kr. 1,000 billion, of which almost 80 per cent was foreign currency-hedged, see Chart A. Each pension fund typically has a strategic framework for the proportion of currency risk to be hedged. The hedging rate is therefore fairly stable. However, practical implementation may also depend on market conditions, e.g. the price of forward contracts, which are typically used for hedging.

#### Dollar exposure and hedging fell in March

A large part of the insurance and pension sector's dollar assets are equities.<sup>1</sup> The dollar exposure fell sharply in March as a result of the large equity price falls. On 20 March, the dollar exposure had fallen by around kr. 150 billion relative to the beginning of the month. Although the insurance and pension sector had reduced its dollar hedging by kr. 75 billion, this entailed a 5 percentage point increase in the hedging rate. Subsequently, the hedging rate has normalised and is now at the same level as at the end of February, see Chart A. This is

due to a combination of a further dollar-hedging reduction and rising dollar exposure due to higher equity prices.

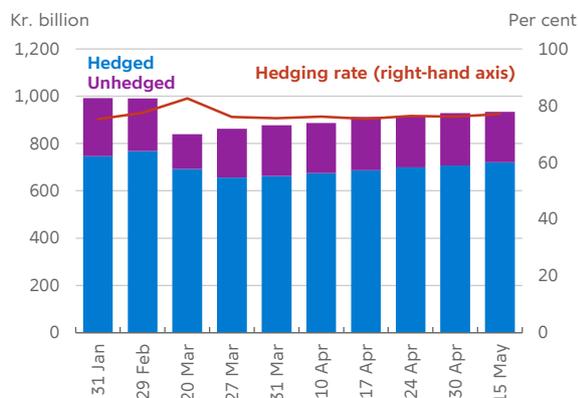
#### Lower dollar hedging led to krone sales of 61 billion in March

Dollar risk hedging through currency derivatives implies dollar sales against kroner or euro. Sales of dollars against kroner can be done either directly or indirectly by first selling dollars against euro and then euro against kroner. Both options result in krone purchases. When hedging is reduced, an opposing contract is concluded, resulting in dollar purchases and krone sales. In March, a reduction in I&P dollar hedging therefore generated krone sales totalling kr. 61 billion, see Chart B.

Some pension funds hedge dollars to euro because they consider the euro currency risk to be minimal due to the fixed exchange rate policy. A large part of the dollar hedging reduction in March came from this channel, see Chart B. It does not affect the krone market.

#### Dollar exposure fell markedly in March

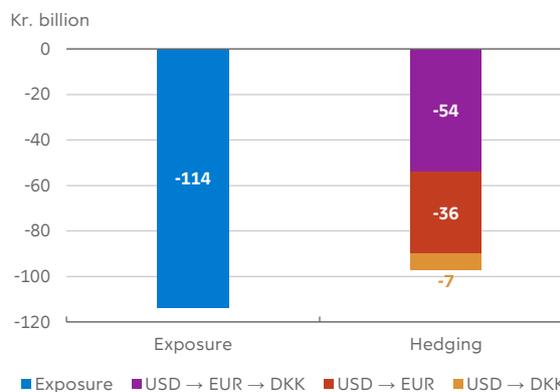
A



Note: Insurance and pension dollar exposure and hedging in 2020.  
 Source: Danmarks Nationalbank.

#### Fall in dollar hedging generated krone sales of 50 billion

B



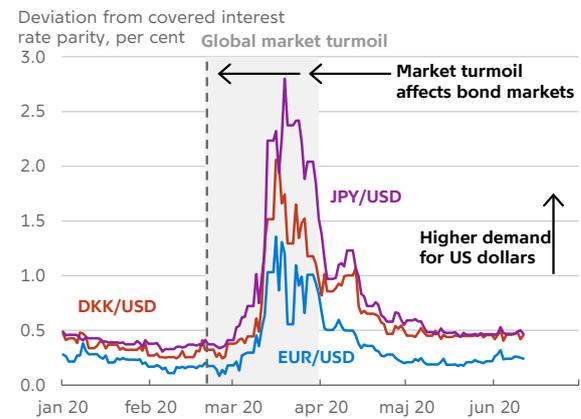
Note: Change in the dollar exposure and hedging of the insurance and pension sector between the end of February and the end of March 2020.  
 Source: Danmarks Nationalbank.

1. In February 2020, the figure was around 60 per cent.

The increased dollar demand also affected other markets, including equity and bond markets. This reflected stronger demand from international investors for dollar-denominated assets rather than assets denominated in other currencies. Among other things, this contributed to the lower market liquidity in the Danish government and mortgage bond market, see above.

US dollar shortage at end-March

Chart 26



Note: Deviation from the covered interest rate parity denotes the difference between the forward spread and the 1-month OIS spread for a currency pair.

Source: Refinitiv Eikon and own calculations.

## PUBLICATIONS



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News offers a quick and accessible insight into an Analysis, an Economic Memo, a Working Paper or a Report from Danmarks Nationalbank. News is published continuously.



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### WORKING PAPER

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The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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