

Denmark: Financial Sector Assessment
Program-Technical Note-Systemic Liquidity



DENMARK

FINANCIAL SECTOR ASSESSMENT PROGRAM

TECHNICAL NOTE—SYSTEMIC LIQUIDITY

August 2020

This Technical Note on Systemic Liquidity for the Denmark FSAP was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed in July 2020.

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COVID-19 pandemic: The Financial Sector Assessment Program (FSAP) work was conducted prior to the COVID-19 pandemic, so this Technical Note does not assess the impact of the crisis or the recent crisis-related policy measures. Nonetheless, given the FSAP's focus on vulnerabilities and policy frameworks, many of the FSAP's findings and recommendations remain pertinent.

Prepared By
**Monetary and Capital Markets
Department**

This Technical Note was prepared by IMF staff in the context of the Financial Sector Assessment Program in Denmark. It contains technical analysis and detailed information underpinning the FSAP's findings and recommendations. Further information on the FSAP can be found at <http://www.imf.org/external/np/fsap/fssa.aspx>

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Glossary

€STR	Euro Short-Term Rate
ABS	Asset-Backed Security
BMR	Benchmarks Regulation
BRRD	Bank Recovery and Resolution Directive
CD	Certificate of Deposit
Cibor	Copenhagen Interbank Offered Rate
CITA	Copenhagen Interbank Tomorrow/Next Average
CP	Commercial Paper
DESTR	Danish Short-Term Rate
DFSA	Finanstilsynet
DKK	Danish Kroner
EEA	European Economic Area
EEC	European Economic Community
ELA	Emergency Liquidity Assistance
ESMA	European Securities and Markets Authority
ESRB	European Systemic Risk Board
EU	European Union
FMI	Financial Market Infrastructure
FX	Foreign Exchange
GDP	Gross Domestic Product
GFC	Global Financial Crisis
HQLA	High-Quality Liquid Asset
IMF	International Monetary Fund
IOSCO	International Organization of Securities Commissions
LCR	Liquidity Coverage Ratio
Libor	London Interbank Offered Rate
LOLR	Lender-of-Last-Resort
LTV	Loan-to-Value
MoF	Ministry of Finance
MoU	Memorandum of Understanding
NBFI	Nonbank Financial Institution
NSFR	Net Stable Funding Ratio
OECD	Organization for Economic Co-operation and Development
OMO	Open Market Operation
OTC	Over-The-Counter
PD	Primary Dealer
RMBS	Residential Mortgage-Backed Security
T-bill	Treasury Bill
U.K.	United Kingdom
U.S.	United States

EXECUTIVE SUMMARY

The functioning of money markets, FX swaps markets and in particular covered bond markets are crucial for the Danish financial system. Liquidity conditions in the Danish financial sector are affected by central bank operations and the lending and funding activities of financial institutions. Nearly 100 percent of the mortgage funding is obtained from market sources, using mainly domestically issued covered bonds. Correspondingly, money markets and foreign exchange (FX) swap markets are crucial to the credit intermediation process and a dislocation in these markets—the inability of financial institutions to roll over or obtain new funding or hedging positions—may have significant consequences for financial stability. Against this background, this note analyzes core funding markets for Danish banks and assesses Danmarks Nationalbank's (DN's) capacity to manage systemic liquidity conditions in normal times and in times of stress.

Covered bond markets in Denmark are liquid and resilient and provide for a long-term funding instrument with comparatively low funding liquidity risk. The Danish covered bond market is the largest in the world. Market-based funding of Danish banks and MCIs is concentrated on the issuance of covered bonds and banks' large deposit base limits demand for unsecured funding. Importantly, and in contrast to other covered bond frameworks, the pass-through (balance) principle shifts market activity to the primary market and mitigates banks' funding risks and ensures that liquidity risks, interest rate risks and FX risks are passed on to a diversified universe of domestic and foreign covered bond investors, which are relying on functioning FX hedging markets. This should overall support the stability of bank funding and positively contribute to financial stability.

The Danish government bond market is small compared to other European peers. The small size of government bond market impacts also secondary market liquidity and consequently, the market does not fulfil the envisaged function as the provider of a benchmark curve to its full extent, in particular for short- and medium-term maturities up to 5 years. The limited availability of government bonds also impacts liquidity regulation. It requires banks to invest in other high-quality liquid assets (HQLA) financial instruments, mainly covered bonds. A close monitoring of banks' HQLA portfolio composition and emerging concentration issues remains crucial, as contemplated by the DFSA.

FX swap markets function well and the trading activity in FX swap markets is usually very resilient during times of stress. Denmark operates under a fixed exchange rate regime against the euro. Structural features such as the central clearing of FX swap transactions via CLS Bank reduce counterparty risk and are supportive of financial stability. In particular the short-term (overnight) FX swap contracts are perceived to be rather liquid and resilient, with high turnover and a high number of active counterparties domestically and increasingly abroad. The functioning of the FX swap is important, as it facilitates both liquidity management and hedging purposes for financial institutions, in particular the pension fund and insurance sector which have increased FX exposures in recent years. The FX spot market is smaller than the FX swap segment, but also stable and resilient, providing DN with the ability to efficiently and effectively intervene in this segment to keep the exchange rate stable.

The unsecured interbank market and the repo market are also active, though play a smaller role for banks' liquidity management. Trading activity in the unsecured interbank market has been following a downward trend since the outbreak of the financial crisis in 2008, given a shift towards collateralized lending, mainly via FX swaps, DN's introduction of daily open market operations and given that banks operate in an environment of ample liquidity. The repo market mainly facilitates market making in covered bonds and serves liquidity management purposes only to a limited extent. The repo market is dominated by pension funds and banks, which borrow mainly domestic covered bonds for market making purposes.

The forthcoming introduction of a new transaction-based interest rate reference rate should improve further the transmission of monetary policy and market integrity. The existing reference rates are widely used in cash and derivatives contracts (T/N rate, CIBOR, CITA SWAP) and critical for market functioning. Currently, work on a new risk-free overnight reference rate is being performed under the auspices of Finance Denmark. A transaction-based unsecured overnight deposit rate (DESTR) is envisaged to be launched in the course of 2020. It is crucial that the transition process is developed and communicated clearly to market participants to ensure a successful transition towards a new benchmark in support of market integrity and financial stability.

DN's standard operational framework is credible and works well in support of the fixed exchange rate regime. DN has been able to keep the exchange rate stable and well within the fluctuation corridor, both in normal times and during episodes of stress, for example in January to February 2015. As was the case in 2015, the low level of interest rates also today overall limits the room for further rate reductions. Under such scenario of increased reliance on FX interventions, a well-functioning and liquid FX spot market is critical. In addition, the impact on domestic liquidity conditions must be carefully assessed.

Through its standard operational framework, DN manages well domestic liquidity conditions. Whereas the widened interest rate corridor contributes to some volatility in money market rates, DN standard operations achieve overall stable liquidity conditions, as shown through an overall close correlation between the policy rate and money market rates.

DN should further improve its preparedness to provide bilateral and market-wide liquidity support to eligible institutions. The standard operational framework is scalable to potentially expand amounts and maturity of liquidity provision to counterparties, and/or against a somewhat widened set of eligible collateral. The provision of liquidity support against credit claims, or portfolios thereof, as collateral currently relies to a large extent on manual procedures, thereby reducing the operational efficiency. DN should finalize the initiated preparatory work on the acceptance of credit claims and credit claim portfolios to further increase the level of automation for assessment, pricing and mobilization procedures. In addition, information sharing and collaboration between DN, DFSA, MIBFA, MoF and FSC should be enhanced further to improve responsiveness. DN should therefore seek greater domestic interagency information sharing, collaboration and crisis simulation to enhance the operational preparedness for both market-wide and bilateral non-standard liquidity support. In the case of ELA, DN could improve preparedness also for relevant counterparties by communicating the specific information requirements in the context of ELA.

Table 1. Denmark: Key Recommendations

Recommendations and Authority Responsible for Implementation	Timing*
<i>Danmarks Nationalbank's Standard Operational Framework</i>	
Monitor closely the composition of collateral posted to identify potential issues of adverse selection (an overly high proportion of posted illiquid collateral) and, if required, adjust the calibration of haircuts to adequately reflect associated market risks. (DN)	ST
<i>Danmarks Nationalbank's Nonstandard Operational Framework</i>	
Complete the automatization of the procedural framework for accepting credit claims as non-standard collateral. (DN)	I
Seek greater domestic interagency information sharing and collaboration to enhance the operational preparedness for market-wide and bilateral non-standard liquidity support, for example, via joint simulation exercises. (DN, DFSA, MIBFA, MoF, FSC)	ST
Monitor more closely the availability of non-standard collateral (horizon scanning). (DN, DFSA)	I
Communicate clearly to key financial institutions the specific information requirements in the context of ELA. (DN)	I
* I: Immediate (within 1 year); ST: Short term (1–2 years); and MT: Medium Term (3–5 years).	

INTRODUCTION¹

1. Systemic liquidity may be viewed as liquidity conditions affecting the entire financial system, including banks, insurers, and other sectors. During the global financial crisis (GFC), systemic liquidity risks were underrecognized by both the private and public sectors and triggered interventions by governments and central banks. New regulatory requirements (Basel III) now include liquidity ratios, that is the LCR and Net Stable Funding Ratio (NSFR), which encourage banks to rely on more stable sources of funding and to hold highly liquid assets that are less likely to suffer from valuation losses during market distress. These measures however focus on individual banks and less on the build-up of financial sector-wide (systemic) liquidity risks, for example due to the banks' common asset exposures or common reliance on similar forms of market-based funding, domestically or cross-border.

2. The note is organized as follows. Section II provides insights into key money and fixed income markets. Section III covers the authorities' liquidity management approach, with a focus on DN's operational framework. Section IV covers key issues of relevance to financial stability and systemic liquidity. This section elaborates on four key issues. First, it analyzes whether banks' strong reliance on market-based funding in particular through covered bonds poses any systemic liquidity risks. Second, it reviews whether FX markets are functioning and resilient, given their important role as liquidity management and hedging instrument in the fixed exchange rate regime. Third, it assesses DN's standard operational framework and its capacity to manage liquidity conditions in normal times. Fourth, it assesses DN's capacity to provide liquidity in domestic and foreign currency in times of stress.

¹ Prepared by Mark Buessing-Loercks (IMF).

STRUCTURE OF DENMARK'S KEY FUNDING MARKETS

A. Money Market and FX Markets

Money Markets

3. FX swaps are the most important money market instruments in Denmark. In particular large banks use FX swaps, both for liquidity management and hedging purposes, with maturities ranging between overnight and tomorrow next (T/N)² (predominantly liquidity management) and to a smaller extent, longer maturities of up to 6 months (mainly hedging). In 2019, FX swaps on average represented a share of 58 percent of daily turnover in Danish money markets, repo transactions a share of 28 percent, unsecured interbank transactions a share of 14 percent, and T/N interest rate swaps and forwards a share of 2 percent.

4. The FX swap segment is dominated by the domestic pension sector, foreign investors, domestic companies and major Nordic banks. The key players are Nordic banks that swap foreign currency funding for Danish kroner (DKK) to fund Danish assets; mainly pension funds and, to a lesser extent, other asset managers are banks' counterparts, swapping DKK for FX to hedge investments in foreign currencies, mainly U.S. dollar and euro. Domestic pension funds' investments in foreign assets have increased continuously due to inflows and asset appreciation, leading to an increasing need to hedge FX exposures. Foreign banks are another important counterpart; these institutions act as market makers and use the FX swap market to take positions on interest rates and the exchange rate. Trades are initiated bilaterally and generally settled centrally via CLS Bank.

5. The unsecured interbank market comprises a smaller though more concentrated share of banks' overall interbank exposures. Trading activity has been following a downward trend since the outbreak of the financial crisis in 2008. This trend is based on multiple factors. First, increased awareness of counterparty credit-risk supported a shift towards collateralized lending mainly via FX swaps or, to a lesser extent, repo. Second, DN's introduction of daily open market operations in 2017 has facilitated recourse to central bank liquidity on a daily basis. Third, with ample current account liquidity, also driven by large inflows from Europe after the crisis and negative interest rates in Denmark, banks enter the interbank market for major transactions, only. Fourth, trading activity is overall increasingly concentrated on a lower number of currently 10 active banks, consequently market share of the largest institutions has increased. Transactions are cleared and settled via the domestic payment system KRONOS.

6. The repo market mainly facilitates market making in covered bonds and serves liquidity management purposes only to a limited extent. High liquidity in FX swap markets and DN's introduction of daily market operations, through which counterparties can sell back DN Certificates of Deposits (DN CDs) to receive liquidity, make repo transactions less attractive. As a result, the repo market is dominated by banks which borrow special collateral -in particular domestic covered bonds- to increase liquidity in covered bond markets and provide liquidity to pension funds

² In a tomorrow next contract, counterparties enter into a FX swap contract with a starting value on the first banking day after the day of entry and expiry on the second banking day after the day of entry.

and asset managers which lend securities, often with longer maturities. A large and increasing share of more than 80 percent of repurchase agreements are over the counter (OTC) trades³ which are backed by covered bonds as collateral.

7. Liquidity in Danish Treasury bills is low, due to small issuance volumes and the dominance of foreign buy-and-hold investors. As part of the overall debt strategy, DN regularly issues Treasury-bills (T-bills) on behalf of the Ministry of Finance (MOF) with maturities of up to one year. The T-bill program is small, with an expected end of year outstanding amount of around DKK 30 billion. Auctions are held twice a month with the longest maturity being 6 months. T-Bills are held mainly by foreign buy-and-hold investors (70 percent), which can achieve higher returns in dollars by investing in Danish T-bills via FX swaps between DKK and U.S. dollar rather than investing directly in U.S. T-bills. As a result, domestic banks hold a comparatively low share of currently 31 percent. Due to limited availability, the use of T-bills as collateral in repo transactions is limited.

8. The domestic bank commercial paper (CPs) is very small, however, a small number of large banks issue CPs abroad in U.S. dollar, euro or other Nordic currencies. Large domestic banks have access to the highly liquid short-term paper markets in U.S. and the euro area. Market access to CP markets provides large banks with an avenue to diversify funding and to reduce overall funding costs, given the currently favorable funding conditions.

FX Markets

9. The very stable exchange rate allows some participants to substitute DKK with euro for liquidity and hedging purposes, leading to a lowered FX turnover in DKK. In particular for the shorter maturities, pension funds and asset managers enter the more liquid U.S. dollar euro FX market to reduce transaction costs. The DKK is the fourteenth most actively traded currency worldwide, measured by turnover-to-gross domestic product (GDP) and turnover in DKK is lower than in other Nordic countries and a wide range of developed market currencies, including those operating under a fixed exchange rate regime, such as Hong Kong. Whereas global turnover in DKK across all FX products has been increasing constantly since 2010, the share of FX transactions in DKK is carried out domestically has been decreasing. In 2019, FX swaps have accounted for nearly 70 percent of all FX transactions, other instruments, including spot transactions (24 percent), outright forwards (4 percent), cross currency basis swaps (2 percent), or currency options (one percent) play a smaller role.

10. The Danish FX spot market is small compared to the FX swap market, though liquidity is stable and resilient. Key players in the spot segment are domestic banks, large Nordic banks and other foreign banks, also domiciled in the United Kingdom (UK). The larger part of the foreign

³ Repurchase agreements with listed securities as collateral, such as Treasury bills, government bonds, and covered bonds, are usually registered on the stock exchange if one of the parties in the transaction is a member of the exchange.

turnover is performed by financial institutions, while a large part of domestic players is non-financial. DN occasionally intervenes⁴ in the FX spot markets to keep the exchange rate stable.

B. Interest Reference Rates

11. Four interest reference rates exist, covering specific segments in the cash and derivative markets segments. All reference rates are administered by the Danish Financial Benchmark Facility (DFBF)⁵ and meet the definition of an interest rate benchmark under the newly implemented EU Benchmark Regulation (BMR). DFBF is supervised by DFSA under the European Benchmark Regulation (BMR). The four reference rates are defined as follows:

- **CIBOR:** interest rate, at which a panel bank would lend DKK for period of 1 week, 2 weeks, 1, 2, 3, 6, 9, and 12 months maturity to a prime bank on an uncollateralized basis,
- **Tomorrow/Next (T/N) rate:** interest rate at which a panel bank has lent DKK with starting value on the first Danish banking day after the day of entry and expiry on the second Danish banking day after the day of entry on an uncollateralized basis,
- **CITA rate:** interest rate swap rate quoted for the day-to-day rate (T/N) against a fixed DKK rate for monthly maturities out to one year,
- **SWAP rate:** interest rate swap rate for yearly maturities out to 10 years quoted against 6 months CIBOR.

12. Turnover and the number of trading participants in the T/N rate and CIBOR rates are following a decreasing trend, thereby reducing the rates' capacity to serve as an adequate reference rate. The T/N rate and the CIBOR rates are widely used as reference rate for the settlement of financial contracts, including commercial lending, mortgages and interest rate derivatives. Both benchmarks are key fixing rates for the Danish market that define on-a-daily basis the average rate at which local Banks lend DKK funds to one another for varying short-term maturities. However, the T/N rate is increasingly determined based on panel banks' quotes as the trading activity remains below required trading activity levels (3 billion DKK) on an increasing number of trading days. Similarly, liquidity (turnover) decreased also for longer-term CIBOR reference rates, which, as a result, are also to a large extent determined based on panel banks' quotes.

13. CITA and SWAP serve as an important reference point for the Danish financial market. CITA and SWAP are reference rates used in the interest rate derivative segment. CITA is used by market participants hedging short-term interest rate exposure, particularly when underlying cash markets lack the necessary liquidity, whereas market participants use SWAP for longer-term maturities. However, both rates are widely used as an indicator for local interest rate market

⁴ See chapter Denmark's Nationalbank's Liquidity Management with a more detailed assessment of DN's FX interventions.

⁵ DFBF is a subsidiary of Global Rate Set Systems (GRSS), an independent company specializing in benchmark administration services, calculating agent and benchmark licensing services.

developments. The daily fixing provides a good indication on the future direction of DKK interest rates and past episodes of stress revealed that CITA tracks the policy rate better than CIBOR.

14. Work on a new risk-free overnight reference rate is being performed under the auspices of Finance Denmark. A transaction-based unsecured overnight deposit rate (DESTR) is envisaged to be launched in the course of 2020. Analyses revealed that the DESTR would perform better than alternative new Danish reference rates (secured or unsecured) given the higher turnover and the lower level of concentration in market activity. In addition, DESTR would conceptually be very similar to €STR which is considered beneficial, due to the close financial links of the Danish market with the euro area.

15. DESTR would entail the following main features:

- O/N deposits from banks and other financial institutions,
- Calculated as volume weighted (12.5 percent trimmed)⁶ mean
- Transaction-based

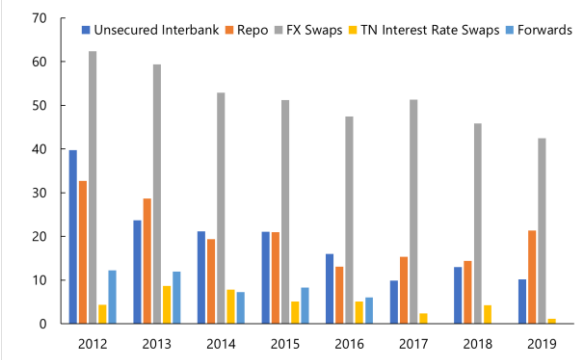
16. Finance Denmark is in the process of developing a term structure for the new Danish reference rate. Such term structure would allow for a replacement of term rates for the CIBOR and CITA reference rates, going forward. However, the scope and timing of the exact transition process is yet to be defined and requires relevant preparatory work also on the side of banks and MCIs, as CIBOR- and CITA-rates are widely used in loan agreements. The existing fallback clauses in loan documentation and in fixed income prospectuses require adjustments ahead of a CIBOR and CITA termination and transition to a new term structure.

⁶ Trimming implies that 12.5 percent of the volume with the lowest rate and 12.5 percent with the highest rate will be excluded before calculating the weighted average rate.

Figure 1. Denmark: FX and Money Markets

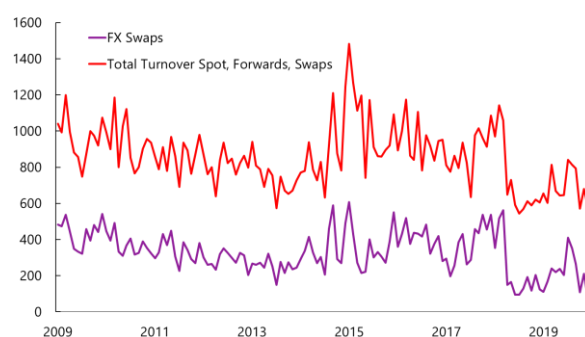
FX swaps are important due to their dual function as hedging and liquidity management instrument.

Money Market Turnover - Instrument Breakdown
(Daily Average, Billions of Danish kroner)



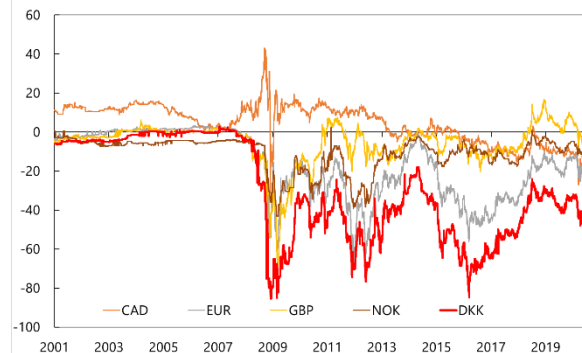
FX instrument turnover has been stable in particular during episodes of market stress.

FX Instrument Turnover
(Billions of Danish kroner)



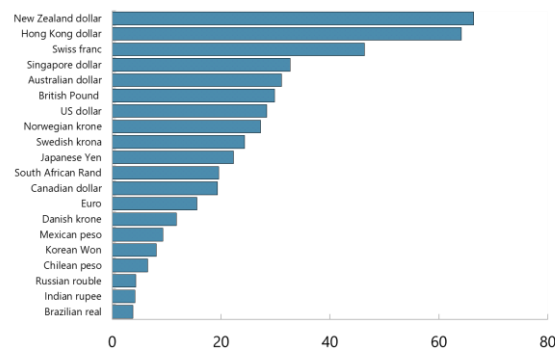
The negative cross currency basis currently supports investments of foreign investors into Danish assets.

5 Year Cross Currency Basis Spreads Against U.S. dollar
(Basis points)



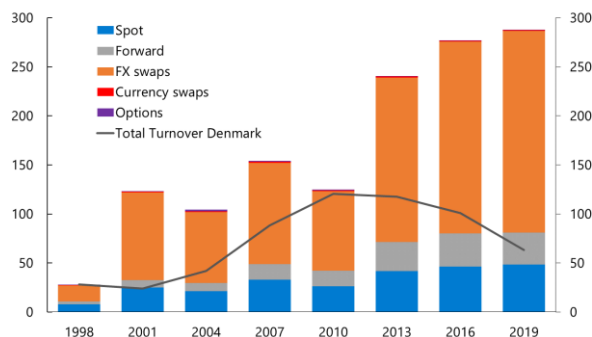
Turnover in DKK is currently small compared to other European and Nordic peers.

FX Turnover to Gross Domestic Product
(Percent)



While FX turnover is overall increasing, counterparties rely to a lesser extent on Danish counterparties.

Danish Kroner Turnover - Instrument Breakdown
(Billions of U.S. dollar)



Turnover in the CITA T/N rate is following a decreasing trend.

CITA T/N Rate and Turnover
(Rate in percent, turnover in Billions of Danish Kroner)

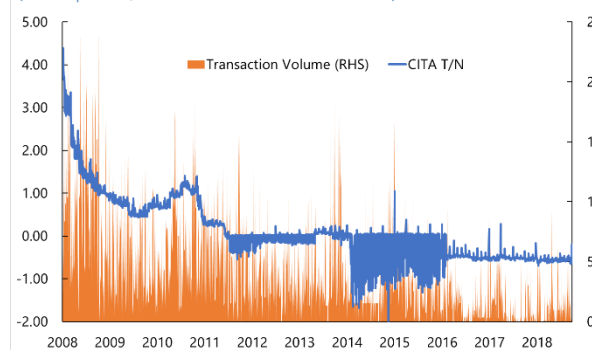
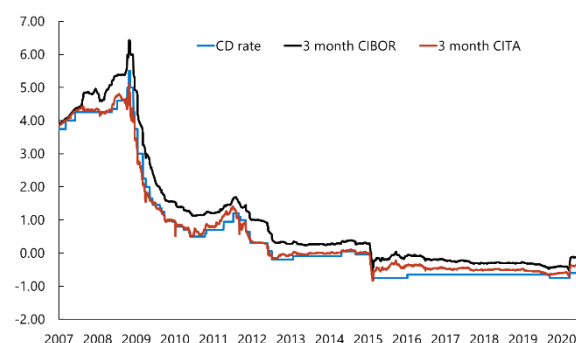


Figure 1. Denmark: Money Markets (concluded)

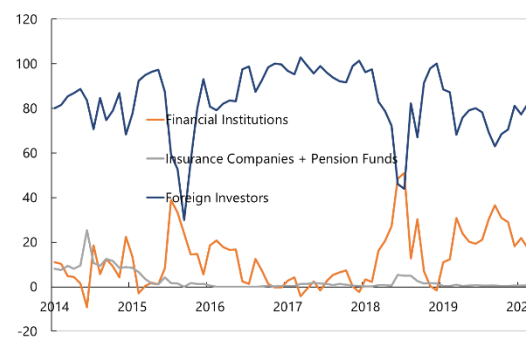
Also longer-term money market rates follow closely DN's policy rate.

Money Market Rates and DN's Deposit Rate
(Percent)



Danish T-Bills are predominantly held by foreign investors.

Treasury Bill Investor Breakdown
(percent)



Source: Bank for International Settlements, Triennial Central Bank Survey 2019, Bloomberg, Danmarks Nationalbank, Statbank Denmark.

C. Sovereign Bond Markets

17. Denmark's government debt policy has been characterized by declining debt. In light of low debt and limited financing needs, the central government's borrowing requirements have remained limited for several years. Consequently, the central government has for many years focused on consolidating borrowing by granting on-lending to government-owned companies. To further consolidate borrowing, the central government began to restructure the financing of social housing in 2018. Current amounts outstanding of central government bonds account for DKK 618 billion (27.5 percent of GDP).

18. The central government offers a list of on-the-run issues, but with issuance concentrated in the 2-year and 10-year segment in recent years. The focus is to build volume in the bonds to levels of liquid benchmark series. DN regularly conducts switch operations, which makes it possible to increase the outstanding volume of new bond series faster, thereby improving liquidity of the bonds. Government bond auctions and Treasury bill auctions are held regularly (twice per month). New securities are also opened via auctions. Danish government securities are traded on a number of electronic interdealer and dealer- to-customer trading platforms as well as over-the-counter (OTC). In most of these transactions, primary dealers (PDs) are one party to the transaction.

19. Government Debt Management and DN have introduced measures to support primary and secondary market liquidity in government securities markets:

- **Primary dealer (PD) system:** primary dealer contracts exist for government bonds and T-bills and are concluded on a long-term basis with banks to trade and resell Danish government bonds to a broad range of investors. Banks that have concluded primary dealer contracts can act as counterparties in the central government's issuance and buyback transactions. Key obligations of the primary dealers are to act as counterparties at auctions of government

securities and to support liquidity by quoting prices in the secondary market on an ongoing basis. PDs receive fees for market making based on a predefined model according to which PDs must meet minimum requirements for price quotation on a monthly basis.

- **Securities lending facility:** PDs have access to the lending facilities of the central government and the Social Pension Fund (SPF)⁷. The central government's lending facility applies to on-the-run government securities and government securities with benchmark status. PDs can borrow bonds or T-bills for a period of up to 5 trading days.
- **Price quoting system:** The central government has a price-quoting system on Nasdaq OMX under which four Danish banks have committed to quote current bid-ask prices.
- **Financing social housing:** Since 2018, the government purchases MCI-issued covered bonds backed by government guaranteed mortgages (new lending and refinancing of adjustable rate loans) and subsequently issues government bonds to meet its resulting financing needs.
- **Shift towards on-lending:** A shift from government guarantees towards on-lending to government-owned entities, which is financed by the issuance of government bonds has gradually increased the issuance of government bonds and primary market liquidity.

20. DN internal analyses revealed that the primary dealer model introduced in 2017 has improved market liquidity for government bonds in various ways. Recent analyses revealed improved liquidity, as shown through an increased number of banks actively trading government bonds, narrower bid-ask spreads and increased turnover in the interdealer market and contribution to narrower yield spreads to German Bunds.

21. However, while interdealer liquidity improved, turnover with end investors is low relative to other European government markets. For maturities up to five years participants perceive Danish covered bonds overall to be more liquid than government bonds, for example, measured based on the maximum transaction size that could be traded without price distortions. Secondary market activity measured by turnover ratio is overall stable, but at times appears to be more volatile and more susceptible to shocks (for example, during 2014–2015) than covered bonds.

22. Danish government bonds are held by a stable investor base with a longer-term investment horizon. Government bonds are predominantly held by domestic pension funds and insurance companies. And pension funds' and insurance companies' holdings follow an upward trend, currently holding a share of 50 percent of government bonds outstanding. Foreign investors - mainly North American and European investors - hold a stable share of 30 percent, following a downward trend since 2014. Domestic banks' share has been at a stable level of around 15 percent. Banks hold government bond in their liquidity portfolio and as HQLA level 1 asset to fulfil domestic LCR requirements.

⁷ SPF's securities lending facility applies to government bonds with more than 1-month remaining maturity of the type bullet loans in SPF's portfolio.

D. Covered Bond Markets⁸

23. Market-based finance in Denmark is focused on the domestic issuance of covered bonds by MCIs. Whereas MCIs issue covered bonds to finance their mortgage portfolios, Danish commercial banks mainly rely on deposits to finance retail lending and mortgages. Some large Danish banks resort to unsecured funding abroad to some extent, for example through the issuance of CPs or longer term senior unsecured bank bonds in the euro area or other Nordic countries. In turn, covered bonds are issued domestically and are denominated in DKK. The amount of covered bonds issues in FX is at a historic minimum of currently 4.2 percent.

24. The market for covered bonds is significantly larger than the government bond segment, with outstanding amounts at around DKK 3,200 billion (142 percent of GDP). The primary market is concentrated, main issuers are the four large MCIs: (1) Nykredit/ Totalkredit, (2) Realkredit Danmark, owned by Danske Bank (3) Nordea Kredit, owned by Nordea Bank Finland, and (4) Jyske Realkredit owned by Jyske Bank. The Danish covered bond market contains three major segments: callable bonds, bullet bonds and floater with or without a cap. The market comprises a great number of securities, but outstanding amounts are somewhat concentrated on benchmark issues (issuance volume above DKK 500 million).

25. The liquidity in covered bond segments is influenced by the specifics of the Danish covered bond legal framework. The strict balance principle creates high primary market activity, as it implies that covered bonds are tap issued, that is in conjunction with the demand for mortgage loans. Following a bond's initial tap issuance, mainly bullet bonds and to an extent floating rate bonds, are refinanced by the issuance of new bonds at refinancing auctions over the life of the loan. To support the structurally somewhat limited secondary market, covered bond issuers have entered into bilateral market maker agreements in order to support secondary market liquidity. Borrowers' early repayments influence liquidity as well, given that covered bonds can be bought back by the borrower at the current market price and delivered to the issuing mortgage bank (under a buy back option) or be bought back at par (fixed rate callable covered bonds). Both buy backs and new issuance impact liquidity.

26. The covered bond investor base remains concentrated, with a large share of covered bonds held by financial institutions and foreign investors. Covered bonds are considered a liquid and high credit quality investment product that serves as a suitable substitute for Danish government bonds. The investor breakdown suggests a large degree of interconnectedness of the Danish financial sector regarding mortgage lending risks. A large and stable share of approximately 50 percent of domestic covered bonds is held by domestic financial institutions. Other important covered bond investor groups are pension funds, insurance companies (together holding 22 percent) and foreign investors (holding 22 percent).

27. Covered bonds play an important role as HQLA level 1 asset for banks to fulfil domestic LCR requirements. Banks heavily rely on covered bonds in their HQLA portfolio, also due to the limited amount of government bonds issued and available to domestic banks. 80 percent of

⁸ See also Appendix I with more specific information on Danish covered bonds.

covered bonds are LCR-compliant as level 1 HQLA (level 1B for the AAA rated Danish covered bonds) given their issue sizes above EUR 500 million. Furthermore, covered bonds with an issue size above EUR 250 million are eligible as level 2 HQLA (level 2A for Danish covered bonds with a rating of at least AA-). Ineligibility under LCR due to a smaller issue size or investor uncertainty on the future issue size (due to tap issuance) and LCR-compliance currently negatively impact investor demand and liquidity for smaller series sizes.

E. Regulation Related to Liquidity Risk

Banks

28. The Danish liquidity regulation essentially mirrors the EU legislation for credit institutions, which entered into force in the EU in January 2014. Systemic and non-systemic banks' total LCR levels are stable and currently range well above the 100 percent minimum. The DFSA monitors on a monthly basis institutions' compliance with LCR requirements (off-site, regular reporting based on EU-framework). In Denmark, LCR requirements encompass:

- **LCR-total (all currencies):** a minimum requirement of 100 percent applies; for systemically important financial institutions (SIFIs) 100 percent has been the minimum requirement since October, 2015.
- **LCR in significant currencies other than DKK:** banks must also ensure a sufficient match between net outflow and liquid assets in relevant currencies. Furthermore, systemic Danish banks must observe a liquidity requirement in currencies making up more than 5 percent of their liabilities. However, the requirement does not apply to Swedish kronor and Norwegian kroner.⁹

29. The NSFR is not yet a formal requirement and will be introduced in June 2021.

Financial institutions are required to report NSFR information on all currencies and per significant currency on a quarterly basis. Currently, no minimum requirement is applied. Banks NSFR levels follow a slightly increasing trend since 2014.

30. Banks' HQLA portfolios are concentrated in terms of asset class and counterparty exposure. Covered bonds play a dominant role in banks' HQLA portfolios, which are complemented by government bonds and central bank deposits. The portfolio composition reflects the limited availability of highly quality liquid assets in Danish kroner outside the covered bond segment. In addition, the concentrated covered bond primary market may lead to concentration issues also at issuer level. For this reason, the DFSA is closely monitoring the use of covered bonds and concentration issues in HQLA portfolios, both at asset class level and at issuer level.¹⁰ No dedicated concentration limits have been implemented yet.

⁹ This exemption was introduced because the Scandinavian Cash Pool allows for the submission of cross-border collateral between Denmark, Norway and Sweden and it facilitates for Scandinavian CLS participants access to intraday liquidity in the Scandinavian currencies.

¹⁰ Under current market conditions, price differentiation across covered bond issuers is marginal, given the high credit quality of both the underlying mortgages and the issuing MCIs. However, price differentiation is expected to (continued)

31. The DFSA and DN regularly exchange information on liquidity and market conditions that may impact LCR requirements. In addition, for institutions with cross border activities, DFSA participates and contributes to supervisory colleges in which liquidity and liquidity risk management issues are discussed.

Investment Funds

32. Investment funds in Denmark have grown appreciably over the past decade. Based on a broader definition, which includes both retail investment funds governed by the Directive on Undertakings for Collective Investments in Transferable Securities (UCITS¹¹) and alternative investment funds (AIFs) governed by the Directive on Alternative Investment Fund Managers (AIFMD¹²), since 2012, the asset under management (AuM) held by the 1,653 investment funds has grown by 79 percent to DKK 2,458 billion (109 percent of GDP). Fixed income investment funds - representing 41 percent of the Danish investment fund market (in terms of AuM)- invest mainly in short term domestic bonds (over DKK 200 billion), but also in emerging market bonds (150 billion DKK) and in speculative grade corporate bonds 130 billion DKK).

33. In particular pension funds and insurance companies, and to a lesser extent banks and MCIs hold considerable shares mainly of alternative investment funds (AIFs). As a result, these fund investors may be indirectly affected by falls in asset prices and tightening liquidity. In addition, investment funds play a crucial role as market participant and liquidity provider in all relevant segments of domestic cash and derivative fixed income markets.¹³ Risks also stem from the interconnectedness between investment funds and banks that sponsor them, as banks may provide support to funds experiencing stress even in the absence of a contractual obligation.

34. As the role of investment funds and possibly other financial institutions (OFIs) grows, related vulnerabilities merit deeper analysis, yet they remain difficult to quantify. At the moment, data availability is somewhat limited to identify and determine the quantitative relevance of investment fund investors. Such breakdown would be relevant to determine overall exposures in particular for pension funds and insurance companies, which invest both directly and indirectly (that is via alternative investment funds (AIFs)), in the domestic fixed income market. Reportedly, a very large share of AIFs is held by pension funds and insurance companies.¹⁴ Precise information about pension funds' and insurance companies' investments in AIFs should allow the FSA to determine the pension funds' and insurance companies' total exposure to important asset classes such as covered bonds.

increase and be more sensitive to dedicated features of the mortgage pool, such as regional distribution, in case market conditions and the credit quality of mortgage borrowers and covered bond issuers decrease.

¹¹ The UCITS lays down uniform rules on investment funds, management companies and depositaries (asset-keeping entity) at EU level. Liquidity risks are contained as the Directive includes requirements on the scope of investment assets, asset concentration, liquidity of assets

¹² The AIFMD represents an EU level regulatory framework for alternative investment fund managers (rather than the fund) of hedge funds, private equity firms and investment trusts.

¹³ Fixed income investment funds invest mainly in shorter term domestic bonds, but also in non-domestic emerging market and speculative grade corporate bonds.

¹⁴ The FSA has collected relevant information on investment funds' and other financial institutions' investors, which was however not been shared with the mission team.

35. In the European Union (EU), regulatory initiatives are ongoing to mitigating risks related to interconnectedness, liquidity and leverage of investment funds.

Both UCITSD and AIFMD contain some requirements that aim at mitigating liquidity risks of investment funds (e.g. a requirement to base asset valuation on fair value). In concrete, AIFs are required to have redemption policies that are consistent with the liquidity profile of their investment strategy and to conduct regular stress tests. UCITS are subject to detailed eligibility rules that govern the types of assets in which they are allowed to invest in. Also, UCITS are required conduct stress tests. Relatedly, limits also exist with regard to the build-up of leverage. The European Systemic Risk Board (ESRB) proposed (2017) to enhance further fund managers' capacity to mitigate liquidity risk, thereby reducing risks at a systemic level. Recommended measures include

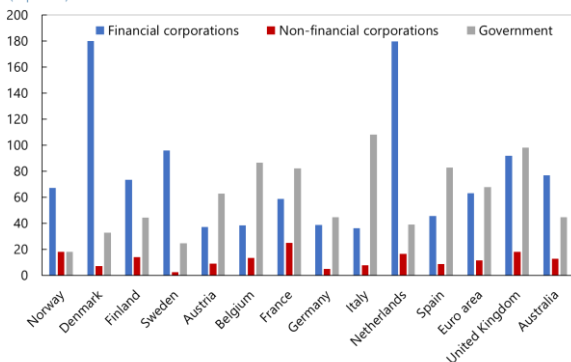
- the introduction of liquidity management tools such as redemption fees, redemption gates, or the ability to temporarily suspend redemptions,
- measures to mitigate and prevent excessive liquidity mismatches in open-ended AIFs invested in illiquid assets
- increased coherence of liquidity stress testing practices
- improved reporting practices for UCITS
- facilitating the introduction of macroprudential tools to limit leverage of AIFs

Figure 2. Denmark: Bond Markets

Debt securities issues by banks dominate the domestic fixed income segment which includes government bonds.

Debt Securities to GDP- Issuer Breakdown

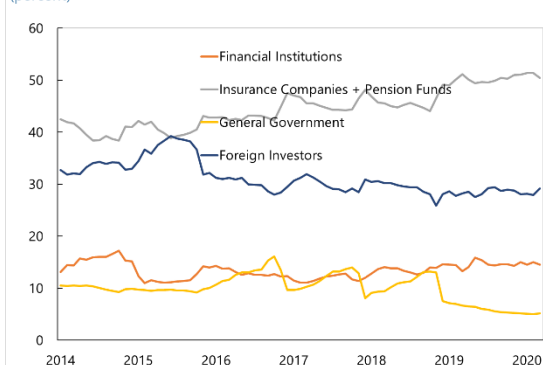
(In percent)



Insurance companies and pension funds hold an increasing share of government bonds.

Government Bond Investor Breakdown

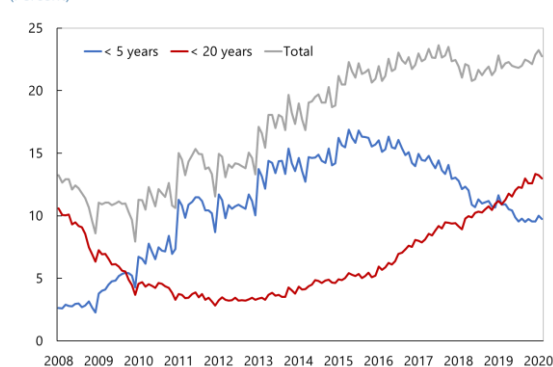
(percent)



The importance of foreign investors is increasing, in particular for longer maturity bonds.

Foreign Investors' Ownership Share of Covered Bonds

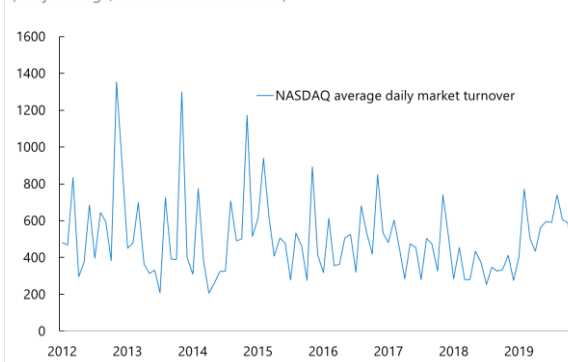
(Percent)



Turnover on covered bond market has been stable and resilient during episodes of stress.

Covered Bond Daily Turnover

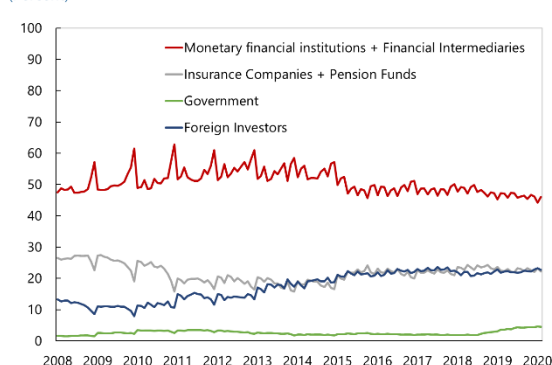
(Daily Average, Billions of Danish kroner)



Financial institutions hold a large share of covered bonds, suggesting a high level of interconnectedness.

Covered Bonds Investor Breakdown

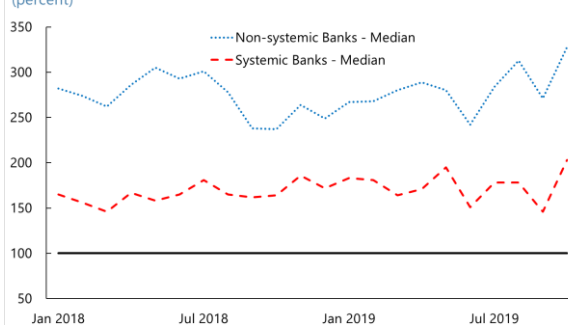
(Percent)



Danish banks' LCR-levels have been well above the regulatory threshold.

Banks' Total LCR

(percent)



DANMARKS NATIONALBANK'S LIQUIDITY MANAGEMENT

A. Danmarks Nationalbank's Standard Operational Framework

36. DN interprets that the National Bank of Denmark Act of 1936 provide the legal basis for the central bank objectives: price stability, safe payments and financial stability. The Act serves as a legal basis for DN to conduct its monetary policy to pursue the objective of price stability through a fixed exchange rate policy against the euro.¹⁵ Consequently, monetary policy interest rate setting through the operational framework follows the sole objective of managing the exchange rate to preserve the fixed exchange rate regime. As a result, DN's operational framework and its design contains dedicated features that support the fixed exchange rate regime.

37. DN separates decisions on monetary policy interest rates from the quantitative management of counterparties' accounts. Policy interest rates are determined to preserve the fixed-exchange-rate regime. DN's liquidity management, in turn, focuses on the management of the size of accounts to ensure sufficiency of liquidity in the banking system in support of money market and payment system functioning, and financial stability.

Monetary Policy Instruments

38. DN has set a ceiling for counterparties' total (aggregated) current account deposits (current account limits). Counterparties use their funds on current account deposits as a means of payment and settle transactions among themselves and with DN, using DN's payment system Kronos. Funds are remunerated at the current account deposit rate (currently zero). The current account limits aim at preventing the build-up of large and freely available deposits that may be used for speculation, while ensuring a functioning day-to-day liquidity management by counterparties. Individual current account limits are determined as a percentage of each banks DKK deposits from costumers.¹⁶

39. DN has actively used changes in aggregate current account limits to support counterparties liquidity management. In case of large demand for liquidity, as was the case in 2008, DN can suspend current account limits. With the introduction of negative interest rates in 2012 and in 2015, DN temporarily increased current account limits to reduce counterparties overall costs for holding deposits in an environment of negative interest rates and a high net liquidity position of the banking system. Currently, counterparties are utilizing their current account fully,

¹⁵ Denmark maintains a fixed-exchange-rate policy vis-à-vis the euro area and participates in the European Exchange Rate Mechanism, ERM 2, at a central rate of 746.038 kroner per 100 euro with a fluctuation band of +/- 2.25 per cent.

¹⁶ Currently each counterparty is awarded a current account limit equal to 3 percent of its deposits up to DKK 2 billion and 1.7 percent on deposits above 2 billion. This ensures that the smaller banks have a larger percentage of their deposits as current account limit. MCIs have a current account limit of DKK 50 million.

reflecting rate differences of the current account (zero percent) and DN certificates of deposits (currently -0.60 percent).¹⁷

40. Regular open market operations contain three types of operations:

- **Weekly open market operations:** containing monetary-policy loans against collateral (at the lending rate). DN sets applicable interest rates, after which the counterparties are free to determine the volume of monetary-policy loans ("open window operations").
- **Daily open market operations:** containing DN's offer to purchase or sale on a daily basis certificates of deposit maturing on the last banking day of the week. In connection with the buy-backs of certificates of deposit; a premium is added to the rate of interest on certificates of deposit when calculating the price for the certificates, creating an incentive to exchange liquidity in the money market instead of selling the certificates of deposits back to DN.
- **Liquidity adjusting operations:** conducted either as deposits, lending against collateral, or as FX swaps, DN provides or absorbs liquidity via auction or conducts bilateral transactions. DN can conduct these "fine tuning" operations with all counterparties or with a smaller group of counterparties.

41. The introduction of the daily purchase or sale of certificates of deposits in 2017 has successfully reduced the volatility in short term money market rates. This volatility was a consequence of the widened interest rate corridor (current account rate – CD rate), and the absence of a central bank facility that allowed for depositing or lending central bank liquidity on a daily basis, between two weekly operations. Since its introduction in 2017, a reduction of volatility has been observable for the T/N rate (operational target), and for other longer-term interest reference rates.

42. To support the fixed exchange rate regime, DN's set of instruments does not contain a marginal lending facility. As a result, money market rates are not capped, but able to rise freely in case of exchange rate pressures and foreign exchange capital outflows. It is assumed that freely rising interest rates will inherently dampen the outflow of foreign exchange, thereby supporting the fixed exchange rate policy.

43. Since mid-2009 the net liquidity position of counterparties has been significantly positive. As a result, counterparties have accessed only sporadically and at low amounts DN monetary policy loans against collateral. In early 2012, three-year monetary policy loans were introduced to increase the availability of long-term funding for counterparties. This also reflected similar three-year loans introduced by ECB. In a concentrated interbank market, recourse to the weekly lending facility has been stigmatized and considered as a source of funding only in case recourse to alternative sources of market liquidity via FX swap, interbank, or repo markets is impaired.¹⁸ However, during the recent crisis episode, many banks used the extraordinary weekly and 3-month lending operations due to the drop in the banks' net position due to FX intervention.

¹⁷ Before the introduction of negative interest rates, counterparties generally maximized amounts deposited in certificates of deposits, and current account deposits were held significantly below current account limits.

¹⁸ Some large counterparties operate subsidiaries or branches in the Eurosystem, which provide access to a daily marginal lending facility against Eurosystem collateral.

44. DN's daily liquidity projections form the basis for DN's planned purchase and sale of certificates of deposit. DN performs liquidity projections which provide an overview of the expected changes in the krone liquidity on a daily basis. In effect, DN's liquidity projection is mainly driven by projections on government payments, for which monthly and daily breakdowns are prepared and published. Monthly breakdowns of government payments are based on government finance estimates provided by the Ministry of Finance (MoF). On this basis, DN creates a daily breakdown of government payments to estimate the day-to-day liquidity requirements of counterparties. DN publishes this daily breakdown and presents the day-by-day projection of government payments, together with DN's planned purchase and sale of certificates of deposit over the following two months.

45. DN's counterparty framework is broad and entities with access to DN's monetary policy instruments encompass:

- commercial banks headquartered in Denmark,
- mortgage credit institutions (MCIs) headquartered in Denmark, and
- branches¹⁹ in Denmark of foreign credit institutions.

46. Currently, 81 monetary policy counterparties have access to a current account. In addition to the monetary policy counterparties, some settlement providers and exchanges have access to a current account, but not the monetary policy instruments. A large share (71 of the 81 monetary policy counterparts) are headquartered in Denmark, 7 counterparties are Nordic banks and three counterparties are international banks. The number of counterparties has declined significantly in recent years.

47. Reflecting the domestic fixed income market structure, DN's collateral framework entails government bonds, government-guaranteed bonds and covered bonds. DN requires collateral for all types of credit facilities and DN transparently specifies and describes the rules for asset eligibility in DN's 'Terms and Conditions for accounts'.²⁰ Terms and conditions specify eligibility criteria on the type and category of securities to be accepted, currency requirements, country of issuance, listing requirements, and lay out the set of applicable risk control measures (haircuts depending on asset category and time to maturity) and valuation procedures. For intraday credit in DKK, account holders can in addition use their holdings of Certificates of Deposit (issued by DN) and make use of automatic collateralization (at Target2Securities and/or VP based on specific securities accounts).

¹⁹ These branches are either subject to the supervision of another EU member state, or of a country with which the EU has concluded a cooperation agreement on home country supervision, and which conduct banking activities in Denmark as defined by the Danish Financial Business Act, branches of foreign credit institutions from countries outside the EU with which the EU has not concluded a cooperation agreement on home country supervision, and which conduct banking activities in Denmark and branches of foreign credit institutions which are subject to the supervision of another EU member state, or of a country with which the EU has concluded a cooperation agreement on home country supervision.

²⁰ Deposits in other central banks may also be accepted under the Scandinavian cash pool. This is an automated system for the pledging of cross-border collateral between Denmark, Norway and Sweden. The system was developed in order to facilitate the Scandinavian CLS participants' access to intraday liquidity in the Scandinavian currencies.

48. Collateral valuation is based on official prices on NASDAQ OMX Copenhagen on the preceding day. In case an asset has not been traded on the previous banking day, a theoretical price set by DN is used for the calculation of its collateral value.

49. The overall collateral framework and operational procedures are reviewed on an ongoing basis. Haircuts are calibrated biannually. Theoretical pricing methodology is assessed annually. The DN risk control framework has been more or less stable since 2015, however, DN improved significantly the quality of its operational collateral management (IT systems) during the same period.

50. DN monitors on an aggregate and individual level the developments on collateral. Although overall amounts of mobilized collateral are low, DN monitors closely the relevant developments regarding amounts of eligible collateral, its availability to counterparties and the composition of collateral mobilized as collateral. The universe of collateral currently mobilized as collateral exceeds the amount of lending provided by DN. Collateral mobilized is biased towards low opportunity cost, illiquid covered bonds.

Exchange Rate Policy

51. The formal framework for Denmark's fixed-exchange-rate policy is the European Exchange Rate Mechanism, ERM II. Denmark participates at a central rate of 7.46038 kroner per euro and a fluctuation band of +/- 2.25 per cent. The ERM II specifies obligations to intervene for both DN and the ECB to keep the currency within the fluctuation band. In case intervention is required at one of the fluctuation limits, DN and ECB would provide an unlimited intervention credit (granted to each other) with an initial maturity of up to three months.

52. For an extended period, DN has successfully managed to keep the exchange rate stable and very close to its central rate. The exchange rate fluctuates around the central rate and well within the fluctuation band. As a result, DN was able to keep exchange rate volatility rather low. DN has at hand a set of measures that allow for a close monitoring of FX market conditions and efficient steering of the exchange rate. In 2015, DN improved monitoring capacities further. DN introduced reporting requirements for transactions of domestic pension funds active in the FX market.

53. As a short-term measure, DN conducts FX interventions by buying and selling foreign exchange in the market. DN intervenes in the FX spot market by trading foreign exchange with a number of major Danish and foreign dealers through various channels, that is via brokers, electronic trading and over-the-counter (OTC). The seven largest Danish commercial banks are required to provide daily information to DN on their currency positions and turnover volumes, and insights feed into DN decision on if and how to intervene. The decision making on intervention pricing and timing of interventions has been delegated to DN's Markets Division. No written intervention policy is in place. DN publishes aggregated monthly intervention volumes on a monthly basis.

54. In situations with persistent inflows or outflows of foreign exchange and upward or downward pressure on the exchange rate, DN changes its interest rates unilaterally to keep the krone stable. In periods of calm FX markets, DN mirrors the ECB's interest rate changes. In case

FX interventions are deemed insufficient to stabilize the exchange rate, DN may adjust the policy rate spread vis-à-vis the euro area to impact capital flows. Such decision is taken by the DN's Board of Governors.

55. The exchange rate regime has proven to be resilient during past episodes of depreciation and appreciation pressure. During the global financial crisis (in particular the period 2008 to 2010), increased uncertainty and larger fluctuations in investors' demand for kroner resulted in larger FX interventions. During this period, interventions were complemented by a gradual though considerable reduction of the policy rate spread. In early 2015, the Danish economy witnessed massive capital inflows and hence upward pressure on the exchange rate following Switzerland abandoning their semi-peg. This event triggered speculation against the Danish fixed exchange rate regime and DN intervened substantively in January and February 2015. At that time, DN abstained from further interest rate reductions, given the already low policy rate (deposit rate reduced to -0.75 percent) and negative policy rate spread.²¹

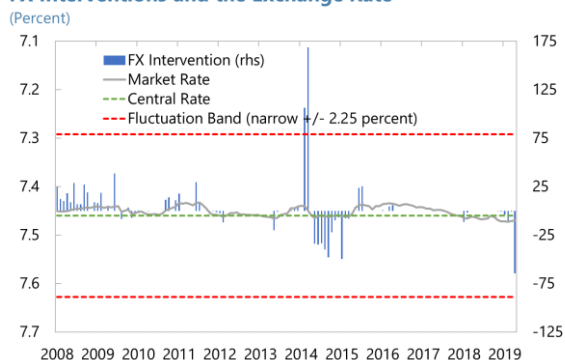
56. Whereas FX reserves have been reduced considerably after 2015, DN's international reserves remain at a significant amount of around 18 percent of GDP. The strong increase in the size of international reserves associated with interventions to defend DKK was gradually reversed afterwards. However, if required, the Danish government stands ready to increase the size of FX reserves and issues foreign denominated debt. Such decision is made in collaboration between DN and the MoF. Currently, international reserves are not sourced via government borrowing. Instead, international reserves are mainly placed as collateralized deposits in European banks or invested in liquid euro-denominated government bonds.

²¹ In 2015, DN interventions and policy rate changes were complemented by the Danish government and the announcement to temporarily suspend the issuance of government bonds to alleviate exchange rate pressures further.

Figure 3. Denmark: Key Rates and Liquidity Conditions

DN has managed to keep the exchange rate with the fluctuation band.

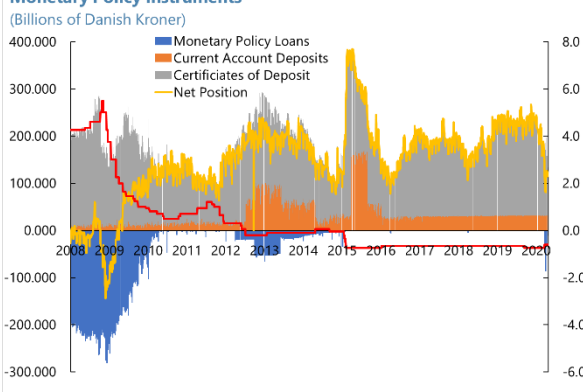
FX Interventions and the Exchange Rate



Interest rates and reserves have been comparatively stable since 2015.

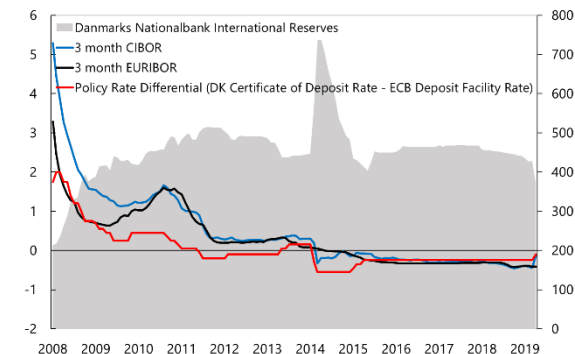
DN and counterparties currently operate in an environment of a liquidity surplus.

Monetary Policy Instruments



During the European debt crisis (2014-2015, DN responded to capital inflows via interest rate reductions.

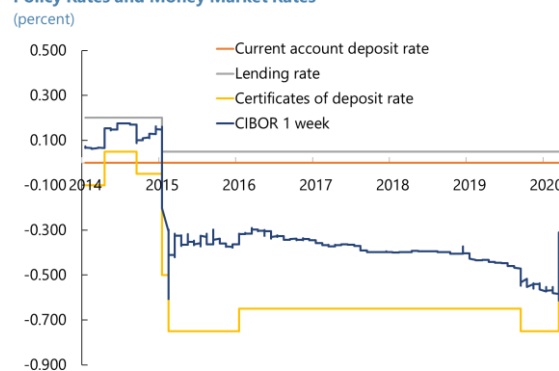
International Reserves and Interest Rates



Turnover in Danish kroner is small relative to other European or Nordic currencies.

DN widened the interest rate corridor in 2015, created room for increased volatility of money market rates.

Policy Rates and Money Market Rates



Sources: Haver, Danmarks Nationalbank, IMF staff calculations.

Notes: In panel 1, the market rate is in DKK/Euro and the FX Interventions is in DKK billion. In panel 2 international reserves are in DKK billion and interest rates are in percent.

B. Danmarks Nationalbank's Approach to Provide Liquidity in Times of Stress

57. Liquidity stress events can be distinguished by type of event—idiosyncratic or systemic—and whether stress is in domestic or foreign currency (Table 2). Idiosyncratic events are dealt with through traditional lender of last resort actions—or Emergency Liquidity Assistance (ELA) — whereas general disruptions to the pricing and distribution of liquidity across the financial sector including in securities markets, require a different approach and set of responses.

Table 2. Denmark: Liquidity Events and Instruments		
	Idiosyncratic—ELA	Systemic
Danish Krone	Danmarks Nationalbank: Financial institutions—ELA policy	Institutions Danmarks Nationalbank: credit operations with expanded maturities, against broadened set of collateral
		Markets -
Foreign Currency	-	Danmarks Nationalbank: Foreign exchange swaps (for example, in euro and U.S. dollar). Danmarks Nationalbank: Foreign currency loans (for example, in euro and U.S. dollar).
Source: IMF Staff.		

58. The National Bank of Denmark Act of 1936 provides the central bank with a sound legal basis to perform its Lender-of-last-resort (LOLR) function and to provide liquidity support in different forms. On this basis, DN can provide liquidity support to preserve financial stability. Eligible institutions include both solvent and viable banks and mortgage credit institutions. In turn, the EU Treaty explicitly prohibits DN from supporting an insolvent credit institution as this would be incompatible with the monetary financing prohibition in Article 123(1) of the Treaty.²²

59. DN publicly refers in general terms to its role as lender of last resort (LOLR) and the broad conditions under which such support could be provided. As part of its crisis management approach, DN may expand eligible institutions' access to DN's loan facilities to preserve financial

²² The Technical Note on Crisis Management and Preparedness discusses in more detail issues related to institutional eligibility of financial institutions.

stability in cases where several institutions are facing liquidity problems at the same time, for example due to a general freeze of financial markets.

ELA

60. DN may grant emergency liquidity assistance ELA to solvent credit institutions that have a temporary need for liquidity and cannot procure it in the market.²³ Eligible institutions include monetary-policy counterparties (that is banks and mortgage-credit institutes). No counterparty is precluded from ELA in advance. DN has specified internally that ELA operations are handled subject to a number of criteria, which remain undisclosed. A Memorandum of Understanding (MoU) between the Nordic-Baltic countries' central banks (see its section 5.4 (a)) specifies that an ELA request should be submitted to the home central bank (that is, the central bank in which the requesting bank is domiciled).

61. Strict rules apply for the acceptance of government guarantees as ELA collateral. In case the requesting credit institution is not able to mobilize adequate amounts of ELA collateral, a government guarantee may in individual cases complement ELA collateralization. In such case, the Ministry of Industry, Business, and Financial Affairs (MIBFA) has to put forward a proposal for the Parliament and a majority in the parliament must support the proposal. However, such a guarantee can constitute state aid and will have to comply with European state aid rules.²⁴

62. Following up on a 2014 FSAP recommendation, DN has developed an internal contingency plan for providing ELA. The plan specifies roles and responsibilities of individual DN business areas in case of an ELA request and has been tested in dedicated simulation exercises, which led to further improvements of the contingency plan. In addition, interagency procedures exist that ensure timely involvement of DFSA and FSC.

Market-wide Support

63. In March 2020, DN has introduced extraordinary lending facilities to provide liquidity in DKK, USD and EUR. The first DKK facility allows counterparties to take standard one-week loans against standard collateral with a favorable interest rate of -0.35 percent. The new facility should ensure counterparties' access to liquidity at favorable terms in case the effects of the COVID-19 crisis have an impact on the liquidity conditions in the Danish banking sector. Furthermore, DN has expanded the extraordinary lending facility with 3-month variable interest rate (at currently -0.35 percent) loans in DKK against collateral. This longer-term facility is aimed at increasing the access of counterparties to longer-term funding. In addition, DN auctions USD and EUR liquidity, offering, on a weekly basis, 1-week (USD) and 3-month (USD and EUR) loans against collateral.

²³ ELA has not been requested in recent years, implying that the absence of a marginal lending facility has not triggered any requests for non-standard liquidity support.

²⁴ The Technical Note on Crisis Management and Preparedness discusses in more detail issues related to institutional eligibility of financial institutions.

64. During the financial crisis (2008 to 2012), DN gradually introduced a series of non-standard measures to ease liquidity stress. These measures included a) temporary credit facilities and b) an expansion of the collateral framework. In concrete, these measures included:

- **Temporarily available credit facilities:** weekly credit facility on the basis of excess capital adequacy, with a maximum of DKK 800 million per counterparty; weekly credit facility against loan bills; monthly offered 6-month and 3-year loans at variable rate;
- **Temporarily acceptance of additional collateral:** loan bills, issued by deposit banks; domestic shares, investment fund shares, junior covered bonds and (on request) unquoted shares issued by funds or corporations, all denominated in DKK or euro; quoted unsecured debt with a general government guarantee and quoted non-subordinated unsecured debt and quoted junior covered bonds with individual government guarantees denominated in DKK or euro; SPV bonds issued on the basis of loans with individual government guarantees; government guaranteed own unsecured debt issued by Danish banks in DKK or euro;
- **FX liquidity provided in the form of FX swaps.**

65. DN has a well-established system in place to monitor liquidity conditions in short-term domestic and foreign currency funding markets. DN conducts monitoring daily by assessing actual liquidity distributions between banks, interbank trading activity and bilateral contacts with main market participants. The DFSA is responsible for the supervision of the liquidity and funding situations in the banks. There is a close dialogue between the two authorities.

66. DN participated in the Nordic-Baltic Stability Group's (NBSG) crisis-simulation exercise in January 2019. The NBSG consists of Ministries of Finance, Central Banks, Supervisory and Resolution Authorities in the eight Nordic and Baltic countries. The exercise involved 31 authorities from Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway and Sweden as well as relevant European Union authorities. The scope was communication and coordination both nationally and cross-borders. This exercise further improved DN's operational preparedness for liquidity support in particular on a cross-border basis.

67. Under the fixed-exchange rate regime, the provision of funding is—whether in the form of idiosyncratic or system-wide liquidity support—contingent upon DN's access to foreign-currency funding. DN's ability to respond is determined by the level of its foreign reserves and its access to foreign currency swap lines with foreign central banks:

- **Sizeable foreign exchange reserves²⁵.**
- **Bilateral swap agreements with the U.S. Federal Reserve and the ECB.** During the crisis (September 2008), DN entered into bilateral swap agreements with the U.S. Federal Reserve and

²⁵ See also paragraph 56.

the ECB. At that time several central banks²⁶ entered into and announced reciprocal swap arrangements with the U.S. Federal Reserve established to address continued pressures in global U.S. dollar funding markets. In March 2020, both reciprocal swap arrangements with the U.S. Federal Reserve and the ECB have been renewed to ensure the provision of euro and U.S. dollar liquidity to Danish counterparties.²⁷

KEY ISSUES OF RELEVANCE TO SYSTEMIC LIQUIDITY

A. The Functioning of Key Funding Markets

68. Covered bonds²⁸ provide for a long-term funding instrument with comparatively low funding liquidity risk.²⁹ Market-based funding of Danish banks and MCIs is concentrated on the issuance of covered bonds and banks' large deposit base limits demand for unsecured funding. Regarding systemic liquidity, covered bonds are less risky than alternative sources of wholesale funding, such as senior unsecured funding and short-term wholesale funding. Importantly, and in contrast to other covered bond frameworks, the pass-through (balance) principle mitigates banks' funding risks and ensures that liquidity risks, interest rate risks and FX risks are passed on to covered bond investors. The pass-through principle, coming along with frequent tap issuances, structurally shifts market activity to the primary market and reduces secondary market liquidity. However, secondary market liquidity is supported by market makers. This should support the stability of bank funding and positively contribute to financial stability.

69. In addition, credit risks are comparatively low due to the legal minimum requirements on the credit quality of underlying mortgage loans and the credit quality of Danish banks. However, tail risks to financial stability and systemic liquidity conditions exist, given the high level of covered bond cross holdings and related interconnectedness. Shocks in the housing market could ultimately impair the functioning of covered bond markets, the refinancing of mortgage loans and increase funding costs.

70. DFSA's monitoring of the LCR requirements should take into account also the interaction with covered bond market activity. Banks' covered bond investments are to a large extent driven by LCR requirements. The limited availability of government bonds requires investment in other HQLA financial instruments and covered bonds in particular. A close monitoring of banks' HQLA portfolio composition and emerging concentration issues remain crucial, as contemplated by the DFSA. A further growing reliance on covered bonds would increase cross

²⁶ These central banks included Reserve Bank of Australia, Banco Central do Brasil, Bank of Canada, Danmarks Nationalbank, Bank of England, European Central Bank, Bank of Korea, Banco de Mexico, Reserve Bank of New Zealand, Norges Bank, Monetary Authority of Singapore, Sveriges Riksbank, Swiss National Bank, and Bank of Japan.

²⁷ The arrangement with the U.S. Federal Reserve amount to USD 30 billion and has an initial maturity of six months, the arrangement with the ECB amounts to euro 24 billion and will remain in place as long as needed.

²⁸ See Appendix I on Danish covered bonds.

²⁹ The Technical Note on Interconnectedness provides further insights into the role of covered bonds for the Danish financial sector.

holdings of covered bonds and concentration issues and likely negatively impact secondary market liquidity.

71. Banks' reliance on foreign investors contributes to diversification of investor base but makes issuers vulnerable to foreign investor sentiment. Foreign demand is stable given that investors are located in different regions and follow a long-term investment horizon; foreign demand is currently also driven by favorable conditions in the FX derivatives markets, providing for a yield pick up relative to other Nordic or European covered bonds. The rising share of covered bond investors in particular for longer maturity covered bonds makes issuers susceptible to shocks in demand, and it remains uncertain whether diminishing foreign demand could be compensated by domestic investors.

72. The government bond market is small compared to other European peers. The small size of government bond market impacts also secondary market liquidity, which is perceived to be rather sensitive to market volatility. In addition, the very liquid covered bond segment negatively impacts the government bond's function as the provider of a benchmark curve, in particular for short- and medium-term maturities up to 5 years. However, efforts have been undertaken by the MoF and DN to increase primary and secondary market activity, which has supported liquidity of the segment.

B. The Functioning of Money Markets and Foreign Exchange Markets

73. FX swap markets function well and the trading activity in FX swap markets is usually very resilient during times of stress. Structural features such as the central clearing of FX swap transactions via CLS Bank reduce counterparty risk and are supportive of financial stability. In particular the short-term (overnight) FX swap contracts are perceived to be rather liquid and resilient, with high turnover and a high number of active counterparties domestically and increasingly abroad. The functioning of the FX swap is important, as it facilitates both liquidity management and hedging purposes for financial and non-financial institutions. First, a well-functioning FX swap market is crucial in particular for the pension fund and insurance sector which has increased FX exposures in recent years, in turn, banks' FX exposure and thus demand for hedging is comparatively smaller. Second, foreign investors of covered bonds or Danish government bonds or T-Bills enter the segment to hedge exposures and generate value, given the negative cross currency basis.

74. The liquidity in the FX spot market is stable and resilient. Compared to the FX swap segment, market activity is lower and more concentrated, with a smaller number of domestic and Nordic counterparties active in this segment. Past episodes of stress have proven that the FX spot market is resilient, providing DN with the ability to efficiently and effectively intervene in this segment to keep the exchange rate stable. The at present somewhat reduced level of turnover in this segment can be associated with the currently low DKK/euro exchange volatility. This allows participants to enter the larger and more liquid euro segment to hedge FX exposures (for example in U.S. dollar), thereby reducing hedging costs.

C. Danmarks Nationalbank's Standard Operational Framework

75. DN's standard operational framework is credible and works well in support of the fixed exchange rate regime. DN has been able to keep the exchange rate stable and well within the fluctuation corridor, both in normal times and during episodes of stress, for example in January to February 2015. As was the case in 2015, the low level of interest rates also today overall limits the room for further rate reductions. Under such scenario of increased reliance on FX interventions, a well-functioning and liquid FX spot market is critical. In addition, the impact on domestic liquidity conditions must be carefully assessed.

76. Enhanced monitoring of pension funds' hedging activities and FX positioning improved DN's capacity to monitor FX market conditions and trends. In 2015, DN introduced reporting requirements on domestic pension funds and their FX holdings and activities. The deepened insights into the size and trends of DKK positions of key market participants and in particular pension funds have improved further the effectiveness of DN's FX intervention framework, especially against the background of a continuously increasing size of the pension fund sector.

77. Through its standard operational framework, DN manages well domestic liquidity conditions under the fixed exchange rate regime. Whereas the widened interest rate corridor and the large discrepancy between CD rate and current account rate (kept at zero percent to ensure that participation in KRONOS does not come at additional costs) contribute to some volatility in money market rates, DN standard operations achieve overall stable liquidity conditions, as shown through an overall close correlation between the policy rate and money market rates. The introduction of daily market operations in 2017 has successfully reduced 'technical' volatility of (T/N) market rates and improved further the functioning of the interbank market by reducing the volatility of short-term interest rates.

78. The introduction of a new transaction-based interest rate reference rate (DESTR) should improve further the transmission of monetary policy and market functioning. Constructed as an unsecured overnight deposit rate, it should correlate closer to DN's deposit based- policy rate, the CD rate. In addition, DFBF and Finance Denmark analyses revealed that volatility of DESTR is expected to be significantly lower than the current official T/N-rate, and more stable especially around quarter and year end. Both for overnight reference rates (T/N rate) and for longer-term reference rates (CIBOR and CITA) the transition process must be developed and communicated clearly to ensure successful transition in support of market integrity and financial stability.

79. Whereas DN's standard collateral framework is well developed, a close monitoring of collateral availability is required. Banks' recourse to the weekly lending operations is currently small and therefore limits DN's exposure associated with the provision of liquidity against collateral. Whereas the overall amounts of collateral available to Danish counterparties are sufficient, posted collateral is concentrated mainly in less liquid covered bonds. Therefore, it is crucial that DN carefully monitors not only amounts of collateral eligible and available to counterparties, but also the size and composition of the collateral posted. Any signals of adverse selection -implying that an

overly high proportion of illiquid collateral is posted- should feed into DN's biennial update and calibration of its haircut schedule, to adequately reflect associated risks. In this context, it may be beneficial to also assess the interaction of DN's collateral policy with local LCR-requirements and the composition of counterparties' HQLA-portfolios.

D. Danmarks Nationalbank's Non-Standard Operational Framework

Market-Wide Liquidity Support

80. DN is prepared to provide market-wide liquidity support to eligible institutions. The standard operational framework is scalable to potentially expand amounts and maturity of liquidity provision to the counterparties, and/or against a somewhat widened set of eligible collateral. In case of need, DN could rely on facilities and procedures it has activated during the financial crisis in 2008 - 2012. Procedures, as well as roles and responsibilities of involved DN business areas are specified, documented and have been tested internally.

81. DN should complete envisaged automatization of its framework for accepting non-standard collateral, including credit claims. Increased automatization would improve efficiency for market-wide liquidity support and ELA. DN's procedures to assess and mobilize credit claims are conducted primarily through manual procedures, which reduces the operational efficiency to accept credit claims (and portfolios thereof) as collateral, if required. DN should finalize the ongoing work on the acceptance of credit claims and credit claim portfolios so as to increase the level of automation for assessment, pricing and mobilization procedures. This would further improve the non-standard operational framework. Increased automatization would ultimately also broaden the collateral base, given that a larger number of credit claims can be processed expeditiously. Generally, a credit claim framework should cover the following interrelated elements:

- **Rules about the legal transfer** of eligible credit claims or credit claim portfolios;
- **Eligibility criteria and minimum requirements at individual credit claim-level:** in particular credit quality, credit claim size, maturity, amortization schedules, underlying collateral (including, but not limited to residential mortgages), place of establishment of the debtor;
- **Eligibility criteria and minimum requirements at portfolio level:** in particular portfolio size, composition (homogeneity on underlying collateral, geographical distribution, debtor concentration), credit quality;
- **Valuation and risk control measures:** valuation methodology and frequency, determination of haircuts to mitigate financial risks, over-collateralization; and
- **Procedural aspects:** timely and accurate exchange of a predefined set of static information and required update frequencies (per credit claim and at portfolio level) with the counterparty in a predefined format.

82. DN should intensify the monitoring the availability of non-standard collateral -in particular credit claims- for the SIFIs and for medium size banks. An institution's access to central bank liquidity is ultimately constrained by the amount of eligible collateral it holds. A good understanding of non-standard collateral available to banks (unencumbered) should feed into an early warning system ('horizon-scanning')³⁰ that may indicate situations of liquidity stress at an early stage.

83. DN should seek greater domestic interagency information sharing and collaboration to enhance the operational preparedness for non-standard liquidity support. Such preparatory work involve the DFSA, MIBFA, MoF, and FSC and include joint simulation exercises and 'horizon scanning'. Monitoring should also include the functioning of key funding markets, such as the covered bond market. This market is essential for the transmission process and the provision of credit to the private sector. The early identification of any impairments in market functioning should, if required, facilitate an adequate coordination, conduct and communication of a response by the relevant authorities.

Bilateral Liquidity Support

84. DN has a sound legal basis to provide ELA in order to preserve financial stability. A well-developed internal ELA framework on rules, responsibilities and procedures exists that ensure a swift response in case of an ELA request.

85. The framework for providing ELA could be further refined. The Nordic crisis simulation exercise provided a good starting point to test and subsequently establish reliable procedures that can be applied in crisis time. In addition, the Memorandum of Understanding (MoU) between the Nordic-Baltic countries' central banks defines clear rules on institutional eligibility in a cross-border context. At the same time, further tests can be undertaken, and their scope widened to improve further operational preparedness of all parties involved.

- **Involvement of Danish counterparties:** DN may want to conduct such tests with domestic systemically important banks and selected mid-sized banks to simulate procedural aspects of an ELA assessment and its provision.
- **Simulating procedures related to the assessment of the ELA request:** DN and involved counterparties could simulate the ELA request and the provision of required information and its assessment by involved DN business areas and the DFSA; such interaction of business areas should include a solvency and viability assessment, the determination of ELA parameters (amount, duration, applicable interest rate, other conditions) and related decision making.
- **Simulating procedures related to the mobilization of non-standard ELA collateral:** such simulation should include mobilization and legal transfer of non-standard ELA collateral (such

³⁰ Horizon scanning should involve the monitoring the counterparty-specific availability of eligible standard and non-standard collateral, involving pre-identifying and pre-checking—from an operational and legal perspective—the eligibility of portfolios of assets well in advance of ELA drawdown.

assets could include for example, individual credit claims and loan portfolios, or equities), collateral eligibility assessment by DN, and the pricing and haircut determination of such collateral.

86. The involvement of counterparties should increase ex ante transparency on DN's ELA framework. The information available to counterparties on ELA procedures could be broadened to improve operational preparedness for ELA, also on the side of counterparties, e.g. in the area of horizon scanning. DN should -without impeding its full discretion on the provision of ELA- communicate more clearly to key financial institutions³¹ the specific information requirements in the context of ELA.

Liquidity Support in FX

87. DN's capacity to provide FX liquidity is strong due to large international reserves and close coordination with relevant central banks. International reserves are adequate in size and liquid. Mechanisms exist to increase international reserves via government borrowing in FX. As a response to the COVID-29 crisis, the swap arrangements with the ECB and the Federal Reserve Bank of New York have been reactivated recently to facilitate the provision of liquidity in USD and EUR.

³¹ In a phased approach, key institutions could be involved with priority, whereas less important firms are involved in a second phase.

Appendix I. Danish Covered Bonds

1. With total outstanding volume of DKK 3,279 billion, the Danish covered bond market is the largest covered bond market worldwide. The issuance of covered bonds is concentrated, with the three largest covered bond issuers (banking groups) covering more than 90 percent of the total issuance. The vast majority of covered bonds is issued by mortgage credit institutions (MCIs), one commercial bank is issuing (non-pass-through) covered bonds (DKK 170 billion). Most covered bonds are issued in DKK.

2. MCIs' business activities are limited to the provision of mortgage loans, which must be funded by the issuance of covered bonds. This implies that all mortgage loans originated by MCIs must meet the minimum legal requirements for cover assets and that funding is limited to the issuance of ROs, SDOs and SDROs; MCIs are not allowed to accept deposits to fund mortgage loans. As a result, covered bonds are issued daily via tap issuance and each mortgage loan corresponds (is matched) to the future cash flow of one or several specific covered bonds currently open for issuance.

3. The limited business activities of MCIs and their dominance as issuers of covered bonds point to a share of more than 80 percent of Danish mortgages funded through the issuance of covered bonds. Covered bonds represent a key funding source for mortgage borrowing also in other European countries. However, the share of mortgage loans funded via covered bonds is considerably lower in all other European countries, in which covered bonds account for 30 to 55 percent of outstanding mortgage loans.

4. The Mortgage Act and the Danish Financial Business Act are the legal basis for covered bond issuance in Denmark. Both Acts contain specific bankruptcy regulations which prevail over general bankruptcy regulations in Denmark. The EU Capital Requirements Regulation (CRR) is applicable to the commercial banks and the mortgage credit institutions (MCIs). The DFSA provides licensing for mortgage credit institutions and commercial banks to issue covered bonds. The issuance by specialized institutions comes with the advantage that a bankruptcy of the parent entity might not necessarily extend to the specialized issuer. However, in case of MCI default, covered bond holders would normally not benefit from a claim on the MCI's parent. In addition, the issuer does normally not hold many assets outside the cover pools, as MCIs are not allowed to hold deposits, thus fund mortgage loans solely through the issuance of covered bonds.

5. Covered bonds can be distinguished with regard to their issuer and their regulatory treatment and based on the underlying mortgage loans. Types of covered bonds can be distinguished as follows:

- **Særligt Dækkede Obligationer (SDOs)**, issued by commercial or mortgage banks,
- **Særligt Dækkede Realkreditobligationer (SDROs)**, issued exclusively by mortgage banks; both SDOs and SDROs are UCITS- and CRR-compliant, thus benefiting from a preferential risk weighting of 10 percent under the CRR;

- **Realkreditobligationer (ROs)**, issued by mortgage banks, only; ROs issued after 2008 are not CRR-compliant and the share of ROs is declining constantly since 2007, currently representing only 7 percent of covered bonds outstanding.

6. All issuers are required to apply a balance principle and complementing rules in connection with covered bond issuance and asset-liability management. As a result, a close connection exists between timing and amount of, on the one hand, payments related to underlying mortgage loans and, on the other hand, payments of the covered bonds to investors, that is mortgage loan-related cash flows are passed through to the covered bond investor. Based on these comparatively strict asset-liability requirements, issuers substantively reduce their exposure to market risks, that is interest rate, FX and prepayment risks, as these risks are passed on to the covered bond investor. Moreover, refinancing risk has been attenuated by legislation which allows for the extension of a bond's maturity by one year if a refinancing auction fails or if interest rates have risen by more than five percentage points in the preceding year.

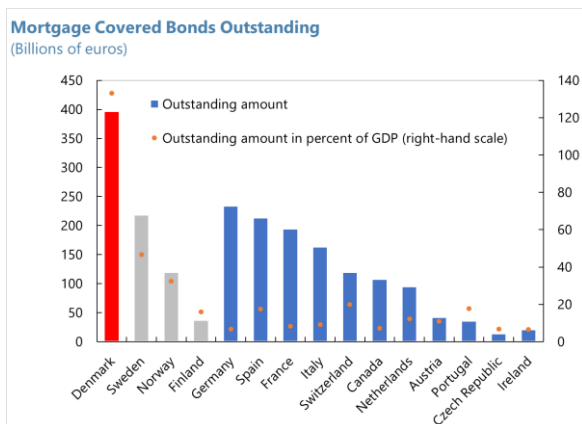
7. Eligibility criteria exist for mortgage loans serving as collateral for covered bonds and criteria differ across the 3 covered bond types. LTV limits exist for each eligible property category (residential, holiday, agricultural, commercial) and for SDROs and SDOs, banks must ensure continuous compliance with LTV requirements, and additional collateral must be provided in case of limit breach.

Appendix Table 1. Denmark: Covered Bond Issuance and Asset Segregation in Europe		
Model of Covered Bond Issuance	Model of Cover Asset Segregation	Jurisdictions
Universal Credit Institutions	Cover Register	Austria, Belgium, Cyprus, Czech Republic, Denmark , Germany, Greece, Finland, Portugal, Romania, Sweden, Slovenia, Slovakia
Specialized Credit Institutions	Transfer to specialized institutions, cover register	Denmark , Portugal, Finland, France, Ireland, Luxembourg, Norway, Poland
Universal/Specialized Credit Institutions	Special purpose vehicle (SPV)	Italy, Netherlands, the United Kingdom
Universal Credit Institutions	No segregation: recourse for the entire portfolio	Spain
Source: European Banking Authority report on covered bonds—recommendations on harmonization of covered bond frameworks in the European Union.		

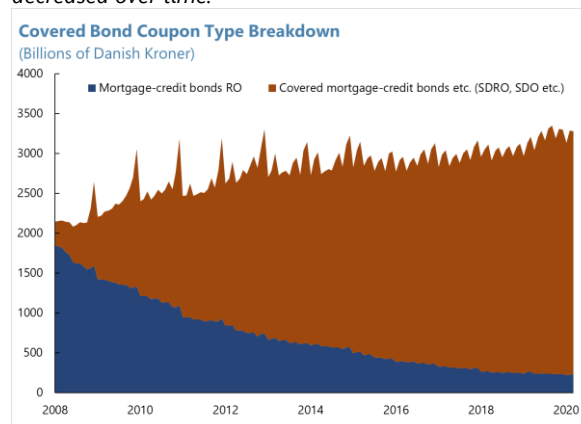
Appendix Table 2. Denmark: Covered Bond Loan Types			
	Covered Bond Type		
	Fixed Rate Callable	Fixed Rate Bullet Loans	Floating Rate Loans
Underlying loan type	Funding of fixed rate callable annuity loans	Funding of adjustable rate annuity loans (ARM) up to the reset day	Funding of loans based on floating rate loans, Referenced to 3- or 6-month CIBOR, Cita or Euribor
Characteristics	Maturities of 10-30 years, fixed coupon, borrower option to prepay bond at par or at market value	Maturities of 1-10 years, fixed coupon, borrower option to prepay at market price of the covered bond	Maturities of 1-30 years, floating coupon, with or without interest-rate-only periods, option to prepay at market value, option to prepay at either 100/105/110, dependent on loan and bond type
Issuance Procedure	Daily tap issuance	Daily tap issuance and four yearly auctions	Daily tap issuance and auctions
Source: NORDEA Nordic Covered Bond Handbook 2019 - 2020.			

Appendix Figure 1. Denmark: Danish Covered Bond Markets

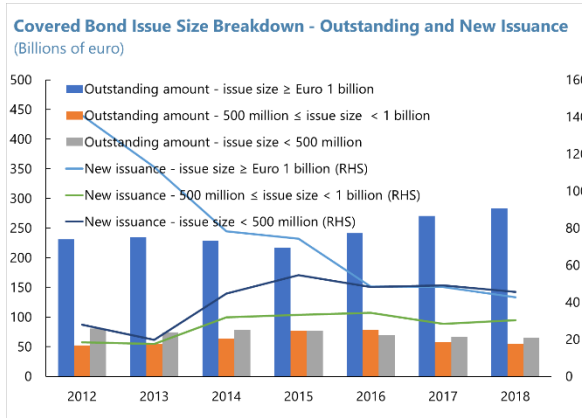
The Danish covered bond market is the largest in the world.



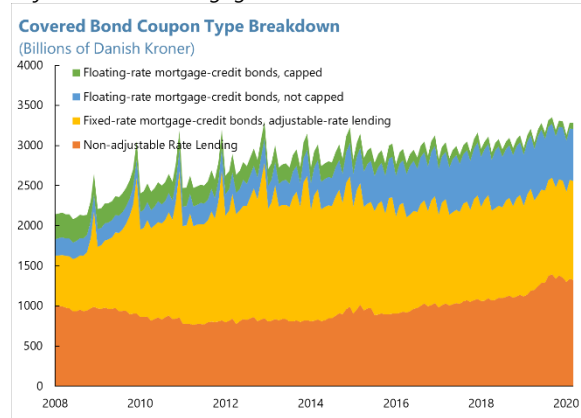
The relevance of non-CRD-compliant ROs has continuously decreased over time.



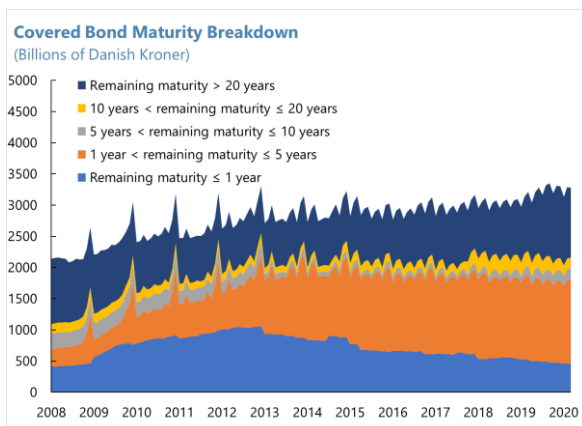
The Danish covered bond market is concentrated in large size issuances.



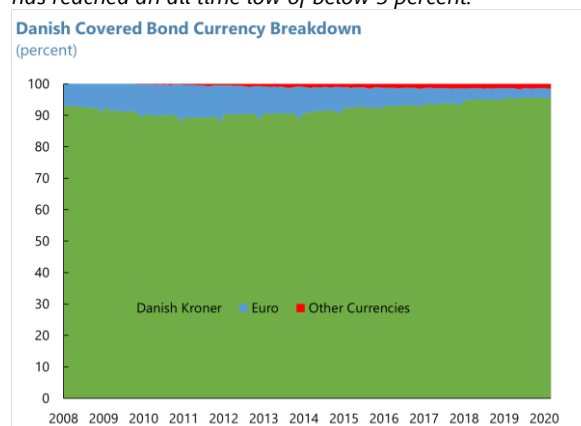
Interest rate developments have led to a shift towards non-adjustable rate mortgage loans and covered bonds ...



... in conjunction with longer maturities.



The share of FX-denominated covered bonds is small and has reached an all time low of below 5 percent.



Sources: Danmarks Nationalbank, European Covered Bond Council.

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