Realkredit Danmark A/S

Danish Mortgage-Covered Bonds – Capital Centre S & T

Ratings

Cut-off date	CC[1]	Eligible cover pool	Cover asset type	Covered bonds[2]	Rating/Outlook
31 Mar 2018	S	DKK 269.3bn	Residential and commercial mortgage loans	DKK 254.2bn	AAA/Stable
31 Mar 2018	T	DKK 508.3bn		DKK 473.0bn	AAA/Stable

1. Capital Center (CC) S & T; 2. særligt dækkede realkreditobligationer (SDROs) – Danish mortgage covered bonds issued under the strict balance principle under the mortgage act.
Scope's covered bond ratings constitutes an opinion about the relative credit risks and reflect the expected loss associated with the payments contractually promised by an instrument on a particular payment date or by its legal maturity. See Scope's website for the covered bond rating definitions.

Capital Centre S & T mortgage-covered bonds

Fundamental credit support	Distance	Ratings	Cover pool analysis
	D9*	(unused)	Cover pool support +9
	D8	(unused)	Cover pool support +8
	D7	(unused)	Cover pool support +7
Resolution regime +4	D6	(unused)	Cover pool support +6
Resolution regime +3	D5	(unused)	Cover pool support +5
Resolution regime +2	D4	AAA	Cover pool support +4
Resolution regime +1	D3	AA+	Cover pool support +3
Legal framework +2	D2	AA	Cover pool support +2
Legal framework +1	D1	AA-	Cover pool support +1
Issuer rating	D0	A+	Issuer rating

Covered bond uplift

*Maximum issuer-specific uplift of nine notches (D9) as per Scope's methodology. The rated covered bonds incorporate a four-notch fundamental credit support uplift.

Rating rationale (summary)

Scope's AAA ratings with Stable Outlook assigned to the Danish mortgage-covered bonds (særligt dækkede realkreditobligationer, SDROs) issued out of Realkredit Danmark A/S (Realkredit) capital centres S and T reflect the A+ issuer rating of the bank, further enhanced by factors specific to the covered bonds:

1. Fundamental credit support: This is the primary rating driver, which provides six notches of uplift above the issuer rating. Only four notches are needed to raise the covered bonds ratings to the highest achievable level; the remaining two notches shield the covered bond rating against a two-notch deterioration of issuer rating.
2. Cover pool support: This could provide up to nine notches of uplift. Both capital centres exhibit strong credit characteristics and the balance principle almost fully eliminates market risk, asset-liability mismatches particularly. Available overcollateralisation mitigates the remaining risks.

Realkredit, a specialised mortgage bank and a core subsidiary of Danske Bank A/S, is the second-largest issuer of Danish covered bonds, with total outstanding covered bonds of DKK 804bn (EUR 107.8bn) as of 31 March 2018. Realkredit actively issues SDROs out of capital centres S and T (individual covered bond programmes), which combined amount to DKK 727bn. The remaining covered bonds are realkreditobligationer (ROs; not rated), covered bonds issued prior to the 2007 covered bond framework amendment; and 'section 33e' bonds (second-ranking senior secured bonds; not rated).

Ratings & Outlook

Issuer rating	**A+/ S-1+**
Outlook	N/A*
Last rating action	NEW*
Last rating action date	29.08.2018
Covered bond rating	**AAA**
Outlook	Stable
Rating action	New
Last rating action date	29.08.2018

*Ratings are under review for upgrade
The issuer has solicited the assigned rating and participated in the rating process.

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Outlook

Scope's Stable Outlook on the SDROs issued out of capital centres S and T reflects: i) fundamental credit support attributable to the bank's covered bonds, isolating the ratings against credit-negative changes in the programmes' risk profiles, and ii) well-matched capital centres with low-LTV cover assets. Cover pool support is currently not needed for the rating but could provide further enhancement. The significant, potential rating buffer of up to five notches also supports the Stable Outlook. Scope believes that the upcoming European covered bond harmonisation will not negatively impact the fundamental support factors relevant for the issuer and for Danish mortgage covered bonds.

Rating-change drivers

Covered bond ratings may be downgraded if: i) the issuer is downgraded by more than two notches and there is no cover pool support, or ii) the legal framework and resolution regime becomes materially less supportive to Danish mortgage covered bonds.

Rating drivers and mitigants (summary)

Positive rating drivers	Negative rating drivers and mitigants
The issuer. Realkredit is closely integrated with and has a dedicated role in Danske Group. It also has longstanding experience in housing finance, and reassuring stand-alone financial fundamentals.	**The issuer.** Monoline business model leads to a strong dependence on developments in the housing market.
Covered bond legal framework in Denmark (+2 notches). The mortgage bank act provides a very strong framework, ensuring the integrity of the covered bond structure to fully support and enforce a recourse to the cover pool.	**Covered bond legal framework.** Not applicable.
Resolution regime assessment (up to +4 notches). Danish covered bonds are excluded from bail-in; Realkredit is deemed resolvable; SDROs are deemed systemically relevant; and a cohesive stakeholder group supports the market's ongoing development.	**Resolution regime assessment.** Not applicable.
Cover pool support (up to +3 notches). The asset quality in both capital centres is sound, supported by the stable performance of Danish residential and commercial mortgage loans. The strict balance principle required by the Danish mortgage act limits market and mismatch risk. Available overcollateralisation is also robust.	**Cover pool support.** Not applicable.

Positive rating-change drivers	Negative rating-change drivers
Issuer/group. An upgrade of Danske Bank A/S would likely result in an upgrade of Realkredits rating, further increasing the buffer of the covered bond rating against issuer downgrades.	**Issuer/group.** A weakening in both the integration and importance of the subsidiary, as well as a weakening financial position, could result in a downgrade of the issuer. However, this would only reduce the covered bonds buffer against downgrades.
Covered bond legal framework. An upgrade is not possible as highest rating is already achieved.	**Legal covered bond framework.** Not expected, highest rating uplift has already been achieved and EU harmonisation is not expected to negatively impact the existing legal framework.
Resolution regime assessment. Not applicable as highest rating uplift is already achieved.	**Resolution-regime assessment.** Significant fall in market share, inability to meet the 'debt buffer', both of which could remove the regulator's incentive and ability to maintain the issuer as going concern and could negatively impact the rating.
Cover pool support. Not applicable as the highest rating is already fully supported by fundamental factors.	**Cover pool support.** Not applicable as the current rating is fundamental support based.

1. The issuer

Realkredit is the second-largest Danish mortgage bank, with a 28% market share

Scope has assigned A+/S-1+ ratings to Realkredit Danmark A/S, the issuer of the rated mortgage covered bonds; the bank's ratings are under review for upgrade. Realkredit is the second-largest Danish mortgage bank, with a market share of 28%. It is a core subsidiary of and strongly integrated into Denmark's largest bank, Danske Bank A/S. The issuer also exhibits sound and reassuring standalone credit fundamentals. For further details on Scope's bank credit analysis see the full bank rating report available on www.scoperatings.com.

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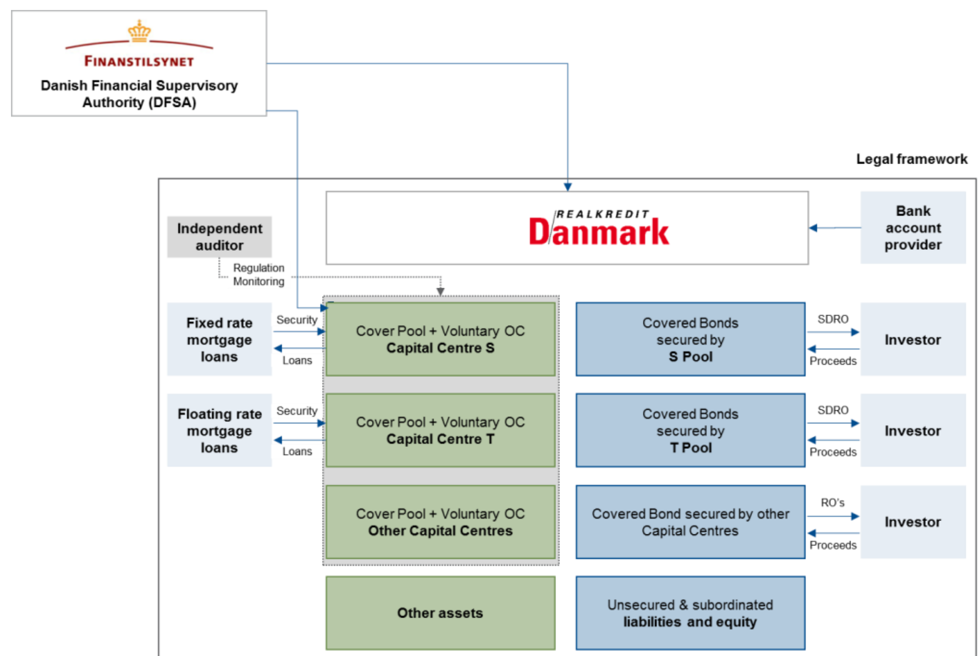
2. Covered bond structure

Figure 1: On-balance sheet issuance structure



Source: RKD and Scope

Realkredit operates as a specialised mortgage bank, originating the majority of domestic mortgage loans within Danske Group. Its mortgage loan products are highly standardised, which provides high efficiency to its operations. The loans are refinanced using SDROs, with issuances governed by the Danish mortgage act (see Legal Framework Analysis for further details) and supervised by Denmark's Financial Supervisory Authority (Finanstilsynet).

3. Covered bond rating analysis

Ratings for the SDROs issued out of capital centres S and T are primarily supported by the credit uplift provided by the fundamental legal and resolution framework for Danish covered bonds. This analylsis enhances the ratings to their highest achievable level (AAA). The cover pool is therefore not needed, but also could support a four-notch uplift for both programmes.

3.1. Fundamental credit support

The Danish mortgage act (Lov om Realkreditlån og Realkreditobligationer) governing SDROs, combined with Scope's credit-positive view on both the resolution regime and the systemic importance of SDROs, enhances the covered bond rating by up to six notches above the issuing bank's rating. Only four notches of these were needed to elevate the rating to AAA.

3.1.1. Legal framework analysis

Strong legal framework provides maximum two notch uplift

A two-notch credit differentiation is driven by the benefits afforded by Denmark's covered bond framework, which Scope considers one of Europe's strongest, in particular due to the strict 'balance principle' applicable to SDROs (more detail below).

SDROs are also among the oldest covered bonds, with the first legal frameworks dating back to the 1850s. Covered bond acts have since been amended, but their core elements, particularly the balance principle, remain. In 2007, the act was altered to allow universal banks to refinance mortgage loans with covered bonds; this was previously restricted to specialist mortgage banks such as Realkredit. The 2007 amendment also introduced elements addressing the Capital Requirements Regulation (CRR), specifically, the regular revaluation of cover assets (article 129, 3). This has become the main factor differentiating ROs, which have no such requirement, and SDOs and SDROs, which require dynamic revaluation and potential 'top-ups'[1]. Further, a March 2014 amendment addresses refinancing risk for short-dated covered bonds, introducing a one-year extension in case refinancing is not possible.

Segregation of cover pool upon insolvency

The framework allows for multiple independent cover pools, or capital centres, with each supporting one set of covered bonds. In a case of the bank's insolvency, or upon a regulatory intervention, a specialised and independently licensed mortgage bank will segregate and isolate cover assets in a capital centre, ensuring one capital centre's default does not affect others. In such a scenario, covered bonds will have a preferential claim on cover assets in their respective capital centre, and the capital centre becomes segregated from the general insolvency estate. Danish covered bonds do not accelerate upon issuer insolvency and will continue to perform according to their terms and conditions.

Ability to continue payments after issuer insolvency

Upon an insolvency of the issuer, the Danish FSA would appoint a special administrator who will manage and monitor the covered bond estates to ensure timely payment. The law specifies that neither a moratorium nor the insolvency of the issuer should impact the ability to make timely payments, and the capital centre concept allows for a clear segregation of cover assets and related cash flows upon insolvency.

Programme enhancements remain available

SDROs have a mandatory overcollateralisation of 8%, based on risk-weighted assets in the capital centre. Combined with Realkredit's calculation method and the pool composition, this typically results in a nominal overcollateralisation of 1.5-2.5% under the internal ratings-based approach, and 3-5% for banks using the standardised approach. The act also ensures a moratorium would not impact any additional programme enhancements, if available.

Key eligibility criteria

The definition of eligible assets follows European standards. There is a regularly updated, maximum loan-to-value (LTV) ratio of 80% for the main collateral type (residential mortgages) and 60% for commercial mortgage loans, including mortgage loans secured by agriculture. There are no restrictions on the share of commercial or residential mortgage loans. Further, the act permits the inclusion of substitute assets (maximum

[1] If upon a negative house price development a loan's LTV is above the threshold – this portion is no longer eligible. Covered bond issuers need to increase the overcollateralisation to reinstate the matching requirements.

15% of the cover pool), including exposures to sovereigns, public-sector entities, and banks (including covered bonds). Generally, cover assets can be domiciled in the European economic area or certain OECD countries.

By law, non-performing loans remain in the cover pool. However, the regulation specifies that non-performing loans are are not fully accounted for in cover pool tests. The respective percentage share depends on i.e. the LTV of the respective collateral; despite the non-performance of the borrower as covered bond investors remain entitled to the proceeds of the foreclosure.

Liquidity and other risk management guidelines

Balance principle results in very strict market risk management among the strongest in Europe

Generally, SDROs are managed according to the 'specific balance principle' (see figure 2) which effectively provides for bonds to be issued at the same terms as the underlying mortgage loans. This method almost eliminates market and liquidity risks. As a result, SDROs typically do not employ derivatives to manage such risks. In addition, risk management requirements for Danish covered bonds are some of the strictest in Europe with regards to interest rate, currency and option risks, tying the maximum deviations of cover pool value to a dedicated share of overcollateralisation or capital. Each capital centre is monitored independently and has to comply with the respective regulations.

Figure 2: **Specific balance principle required under the Danish mortgage act**

Interest rate risk	Parallel shift by +/- 100bps and twist; max loss limited to 1% of capital; no offset of interest rate between currencies
Foreign exchange risk	Stress testing and loss limit of 0.1% of capital
Option risk	Structural limits on call options and index links (netting of option exposures between different currencies is generally not allowed)
Liquidity risk	Limits on temporary mismatches: 25% (1-3 years); 50% (4-10 years); 100% (>10 years)
Substitute collateral	Maximum 15%; can also comprise own covered bonds and those from other credit institutions; cash flows should broadly match

Liquidity risk for Danish covered bonds is very low due to the requirement to match asset redemptions with covered bond redemptions due. This is further facilitated by the ability to use substitute assets, which are introduced to capital centres to meet regulatory overcollateralisation levels. Further, the 2014 amendment of the act addresses the refinancing risk of adjustable-rate mortgages: If the refinancing of a corresponding short-dated covered bonds fails, the repayment structure effectively becomes pass-through and investors are compensated through a 5% increase of the interest rate until the next refinancing.

Covered bond oversight

The Danish FSA supervises the issuance and maintenance of covered bond programmes. Day to day compliance with cover pool management is typically monitored by the internal audit departments. As part of the annual review, independent auditors review relevant provisions and notify the FSA on findings.

Other legal framework considerations

SDROs fully comply with the UCITS and CRR. Scope does not expect a credit-negative impact from the upcoming European covered bond harmonisation because the rating-relevant aspects are already covered by the Danish legislation.

3.1.2. Resolution regime and systemic importance

Realkredit's covered bonds benefit from an additional four-notch uplift to reflect general and issuer-specific benefits provided by the resolution regime as well as the systemic importance of covered bonds in Denmark.

Resolution-regime analysis supports additional credit differentiation

This reflects that upon a regulatory intervention the issuer will preserve the credit quality of a covered bond. Scope assesses whether:

1. Danish covered bonds comply with regulatory definitions to benefit from preferential status;
2. The issuer is bail-inable and whether regulators are likely to use available tools to preserve the issuer's operations;
3. Danish mortgage-covered bonds and the issuer's own covered bonds are systemically important in the domestic context; and
4. An active domestic stakeholder group (issuers, regulators and investors) is working together to maintain confidence and a high credit quality of the covered bonds.

SDROs are excluded from bail-in. They meet the UCITS 52 (4) definition of a covered bond and are thus not impacted upon a regulatory intervention into other debt.

One notch of uplift reflects Scope's view on the resolvability and likely maintenance of Realkredit in a resolution scenario. This includes the benefits of being part of Danske Bank, a systemically important financial institution. Danish mortgage banks like Realkredit are exempt from the 'classic' MREL. However, Danish mortgage banks are required to have a debt buffer comprising two percent[2] of their unweighted lending, which would enable them, and not only their covered bonds, to operate as a going concern, even in distress.

Another notch of uplift reflects Scope's view on Realkredit's prominence as a covered bond issuer both domestically and internationally, and the significant systemic importance of covered bonds in Denmark.

Realkredit's covered bond issuances and market share of 28% results in a high systemic importance. Realkredit has a long history in covered bonds and is the second-largest covered bond issuer in Denmark.

Scope generally considers Danish covered bonds to be a systemic refinancing product for residential mortgages. The Danish covered bond market is one of world's oldest, with a 221-year history. It is also the largest globally, with EUR 398bn of outstanding covered bonds at year-end 2017. On average, total outstanding covered bonds account for more than 140% of Denmark's GDP (in comparison, Danish government debt makes up only 45%). During the last five years, average annual issuances totalled EUR 145bn. Regulators are therefore conscious of the high systemic importance of Danish mortgage banks, whose domestic covered bonds account for the largest share of tradable debt in Danish capital markets. At present, nine banks are licensed to issue covered bonds, with 23 active programmes in total.

The fourth notch of uplift reflects the very cohesive and supportive stakeholder group in Denmark. Covered bond issuers actively collaborate under the umbrella of Finance Denmark and the Association of Danish Mortgage Banks, promoting the product and initiating changes to the domestic (and even the international) covered bond framework. These include the March 2014 amendment as well as changes to the BRRD, CRR, and the upcoming European covered bond directive. Danish covered bond investors such as

[2] For systemically important mortgage banks the 2% debt buffer can be increased to eight per cent by 2020 to allow the central bank to pursue the preferred resolution strategy (divestment, continuation using a 'bridge bank', or orderly wind-down).

banks and insurers actively use covered bonds to substitute for long-dated Danish-kroner government debt, to manage liquidity, and to protect against foreign exchange risk. Almost 80% (as of June 2014) of Danish covered bonds are held by domestic investors, which Scope believes supported the ongoing functioning of the covered bond market during the crisis. Scope has observed that issuance and trading in Danish covered bond markets have continued while other countries' markets hibernated or were closed.

Moreover, the Danish central bank has supported covered bonds by allowing their use in its repo operations. The Danish FSA is an active stakeholder given covered bonds' widespread use as a funding tool. Lastly, the FSA has established macroprudential tools such as the 'supervisory diamond' to preserve the ongoing quality of collateral, effectively contributing to the quality of mortgage covered bonds.

3.2. Cover pool analysis

Cover pool provides additional rating uplift to protect the highest achievable rating

The characteristics of capital centres S and T alone could also theoretically support the AAA rating as these can provide at least four notches of uplift for each. An overcollateralisation of 1.3% for capital centre S and 2.5% for capital centre T would be sufficient to support a AAA rating because both exhibit a sound credit quality.

Figure 3: Key cover pool characteristics

Capital centre	S	T
Reporting date	31 March 2018	31 March 2018
Total cover pool (DKK m)	269,261	508,320
Covered bonds outstanding (DKK m)	254,212	472,985
Current overcollateralisation	5.9%	7.5%
Minimum regulatory collateral	8%*	8%*
Duration/ WAM (cover pool)	9.06/ 13.17	9.85/ 14.26
Duration/ WAM (covered bonds)	9.58/ 13.82	10.82/ 15.45
Duration/ WAM Mismatch	-0.52/ -0.65	-0.97/ -1.19
Overcollateralisation to support current rating	1.30%	2.50%
Overcollateralisation to support current rating upon a one-notch issuer downgrade	1.60%	3.50%
Main cover pool asset type	Residential mortgages	Residential mortgages
Number of loans	165,768	263,314
Avg. loan size (DKK '000s)	1,236	1,253
Avg. whole loan LTV	63%	62%
Top-10 exposure share	1.9%	4.7%
Top-20 exposure share	3.1%	7.0%

* 8% of risk-weighted assets translate into an nominal overcollateralisation of 2-4% on a risk-weighted basis.
Source: Realkredit and Scope

3.2.1. Cover pool composition

Both capital centres are secured predominantly by Danish commercial and residential mortgage loans denominated in Danish kroner. As of March 2018, only 11bps of mortgage loans in capital centre S were denominated in Swedish-kroner, and only 2bps were in euro. For capital centre T, 4.1% of loans are exposed to mortgages outside of Denmark (Sweden and Norway), 3.1% are denominated in Swedish kroner, 2.8% in euro, and 0.8% in Norwegian kroner.

Both pools are highly granular with 165,768 of mortgage loans for capital centre S and 263,314 for capital centre T. The top 10 loans account for 1.9% in capital centre S and 4.7% in capital centre T, respectively.

Capital centre S mainly comprises fixed-rate assets; capital centre T, floating-rate assets

The main difference between the two capital centres is the interest rate: 96% of mortgage loans in capital centre S are fixed for life; all loans in capital centre T are floating-rate, with most having reset periods of below five years.

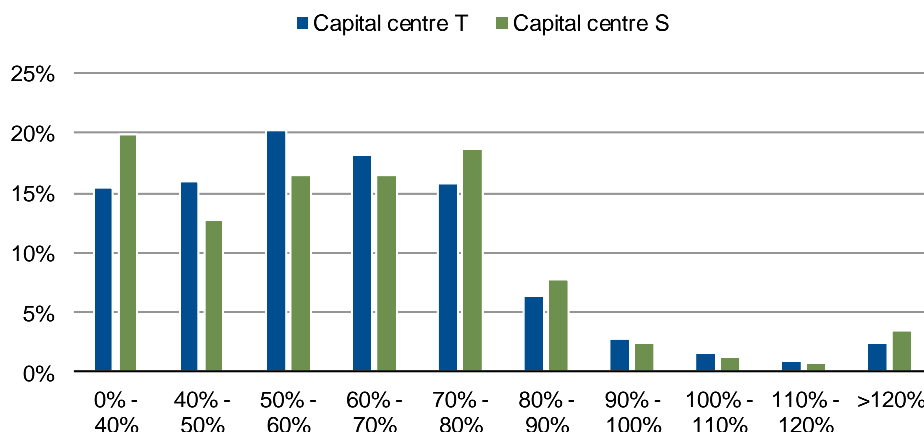
The share of commercial loans in capital centre S is also lower than in capital centre T. Mortgage loans with a residential purpose (including private rental residential, cooperative housing and subsidised housing) account for 88% in capital centre S and 72% in capital centre T. The share of holiday homes is small and accounts for less than 3% in both capital centres. Commercial loans relate to i) businesses (mostly offices and retail), which have an 8% share in capital centre S and 21% in capital centre T; ii) agriculture (S: 3%; T: 6%); and iii) some industrial.

Average LTV slightly above 60% for both capital centres

Average indexed LTV is similar: 62% for capital centre S and 63% for capital centre T. Commercial loans have lower LTVs (S: 56%; T: 54%), which provide strong protection against credit losses in the case a borrower defaults.

The Danish covered bond act stipulates a maximum LTV of 80% for residential real-estate loans with up to a 30-year maturity and a 10-year interest-only period. For commercial, agricultural and real-estate loans, LTV generally must not exceed 60%. However, both capital centres have loans that have more than 80% LTV (S: 16%; T: 14%). This either reflects additional guarantees for the LTV share exceeding the limit, or a decrease in property values since origination. For the latter, the loan part that exceeds the above threshold is collateralised with substitute assets by the issuer.

Figure 4: Cover pool by loan-to-value



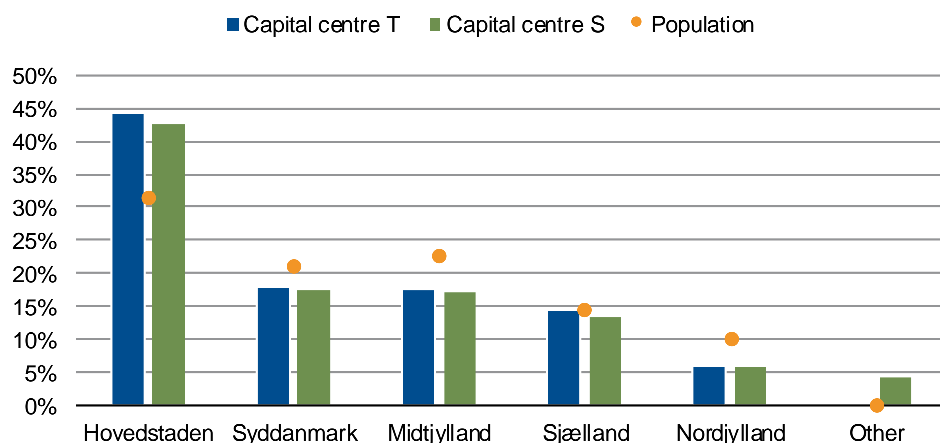
Source: Realkredit and Scope

All commercial loans and 86% of residential mortgages are subject to an initial full valuation. All mainstream residential properties are subject to automated valuation.

Capital centre T has a higher seasoning than capital centre S: 4.6 years versus 2.4 years. The remaining term to maturity is 24 years for capital centre S and 22.9 years for capital centre T. On average, the remaining term for commercial loans is only two years below that for residential loans.

Around 82% of the mortgage loans are exposed to urban arrears, while the highest share of properties is concentrated in the Danish region of Hovedstaden, which contains the national capital, Copenhagen. Both capital centres' exposure to Hovedstaden account for around 43%, which compares to around 31% of the total population.

Figure 5: Regional distribution



Source: Realkredit and Scope

3.3. Credit risk assessment

Low credit risk…

Scope assesses credit risk in the covered bond programmes to be low, given their record of benign delinquencies – even during the financial crisis and the slump in Danish real estate prices between 2007 and 2009. Low credit risk is also driven by the high cure rates and strong recoveries.

Scope's projections of default on mortgage loans use an inverse Gaussian distribution. Based on available credit performance data provided by the bank (in particular vintage and loss data) and benchmarking, Scope has derived an effective, weighted average lifetime mean default rate of 3.1% for capital centre S (applying a cure rate of 62%) and 2.6% for capital centre T (cure rate of 64%). The lower losses for capital centre T, despite the higher share of commercial loans, are driven by its higher seasoning and its higher cure rates for commercial loans.

Scope has assumed a volatility of defaults (weighted average coefficient of variation) of 50% for capital centre S and 75% for capital centre T. Assumptions for capital centre T incorporate a potential increase in borrower defaults if margins increased by up to 500bps – in the case a covered bond's refinancing fails. Capital centre S is not exposed to refinancing risk because loans are fixed rate for life.

…mean loss is below 1% in a stressed scenario

Scope estimates a weighted average recovery rate for capital centre S ranging from 89.2% for the base case to 72.5% for the most stressful scenario; for capital centre T, the respective figures are 87.9% and 69.3%. This translates into a mean loss rate for capital centre S of 0.34% in the base case and 0.86% in the most stressful scenario; for capital centre T, these were 0.31% and 0.80%, respectively.

Scope's projections of default on substitute assets follows a non-parametric distribution calculated using a Monte Carlo analysis.

The substitute asset sub-pool is predominantly exposed to Danish covered bonds and sovereign exposures to Denmark and France. This sub-portfolio is highly concentrated. Scope has conservatively analysed the sub-pool with only eight counterparties even though they relate to covered bonds issued out of different capital centres. For capital centre T, substitute assets also consist of 15.8% of covered bonds out of capital centre T.

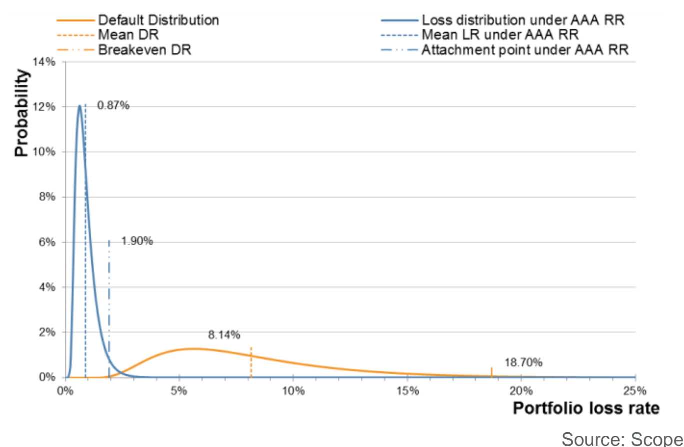
Scope has assumed that the default likelihood of the substitute assets would equal that indicated by the respective issuer ratings. The remaining term has a floor of one year and is capped at 30 years.

Scope has applied a stressed sovereign recovery of 40% and a base case recovery of 100%. For the exposure to covered bonds, a stressed recovery of 60% and base recovery of 80% were assumed.

Refer to Appendix I for Scope's recovery rate analysis.

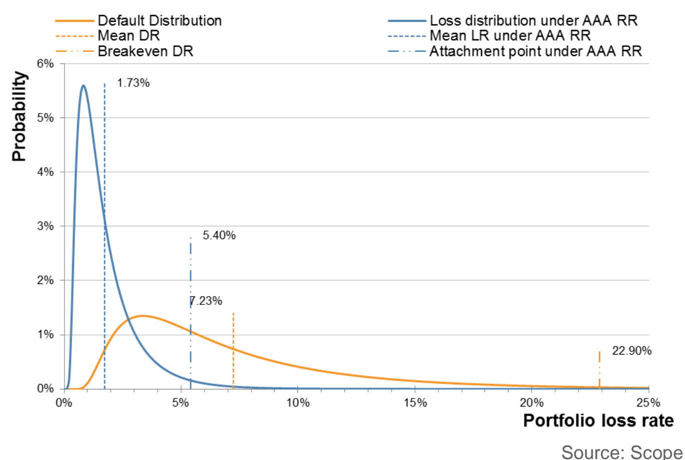
Figure 6: Default and loss distribution

Capital Center S



Source: Scope

Capital Center T



Source: Scope

3.4. Market risks

Asset-liability maturity mismatches benefit strongly from the balance principle

In Europe, Danish SDROs and ROs are the least sensitive to changes in market risk and generally have no mismatch risk due to the strict balance principle (refer to Legal Framework Analysis section) – also resulting in regular tabs of outstanding covered bonds. Once a new mortgage loan is granted, an outstanding covered bond with the same terms and conditions increases in size.

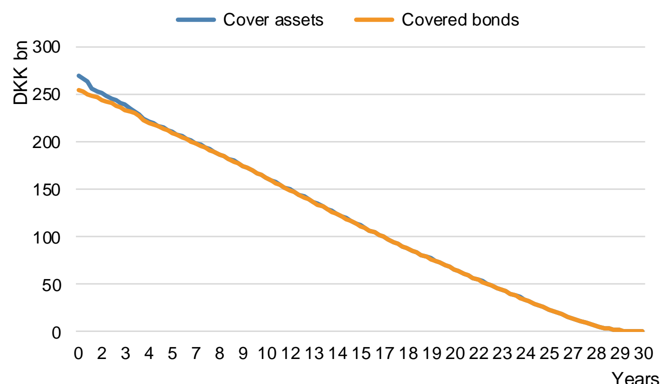
Mismatches generally result from minimum, regulatory and voluntary overcollateralisation, typically creating a moderately negative asset-liability mismatch.

Despite the almost matched maturities, the combination of interest-only and adjusted-rate mortgages introduces risks related to the refinancing of certain bonds during the life of the loan. Regulators have mitigated this risk by introducing a mandatory automatic extension of such bonds, effectively resulting in conditional pass-throughs. Currently, only capital centre T comprises such bonds; loans in capital centre S never require refinancing because of their fixed rates for life.

Further, around 8.5% of bonds in capital centre T are hard-bullet as they were issued before the March 2014 amendment and were grandfathered. Around 1.7% of bonds in capital centre S are hard-bullet.

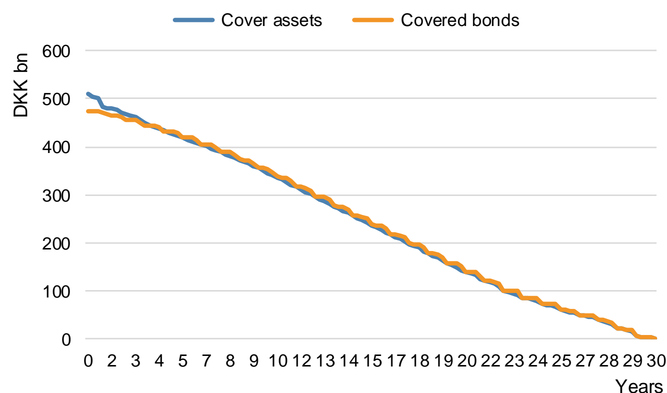
Figure 7: Asset and liability amortisation

Capital centre S



Source: Scope

Capital centre T



Source: Scope

In a stand-alone and run-down scenario, current overcollateralisation and available excess spread would provide sufficient scheduled inflows for the bonds' full repayment at the scheduled or legal final maturity date. This implies that the programme does not need to sell assets to ensure full and timely payment of maturing covered bonds and interest due.

When determining the minimum overcollateralisation necessary to support a four-notch cover pool uplift, Scope identified that the need to sell cover assets to meet covered bond redemptions on a timely basis would occur only if overcollateralisation was scaled down.

To establish stressed proceeds upon an asset sale, Scope has discounted the remaining cash flows of the capital centres, adding an additional liquidity premium. See Appendix I for further details.

3.4.1. Interest rate risk

Low interest rate risk predominantly stems from substitute assets provided as overcollateralisation

Due to the balance principle, the bonds mirror the interest rate types of the corresponding mortgage loans. Accordingly, there is no immediate interest rate risk from the mortgage loans and from refinancing the bonds. However, both programmes are sensitive to a rising interest rate, mainly because substitute assets held as overcollateralisation will still pay a fixed coupon when NPVs suffer from rising rates.

See Appendix I for further information on the interest rate risk analysis.

3.4.2. Foreign exchange risk

Limited foreign exchange risks driven by overcollateralisation

The balance principle also addresses the matching of currencies, ensuring foreign currency assets are refinanced with covered bonds denominated in the same currency. Accordingly, foreign exchange risks are limited and are predominantly driven by substitute assets.

Capital centre S is exposed to an appreciating Danish kroner because substitute assets held in Swedish or Norwegian kroner have no matching bond. Capital centre T is exposed to a depreciating Danish kroner despite asset and liabilities almost perfectly and naturally hedging each other. There is an open position through assets written down by losses; therefore foreign currency-denominated liabilities exceed foreign currency denominated assets.

See Appendix I for further information on the foreign exchange rate risk analysis

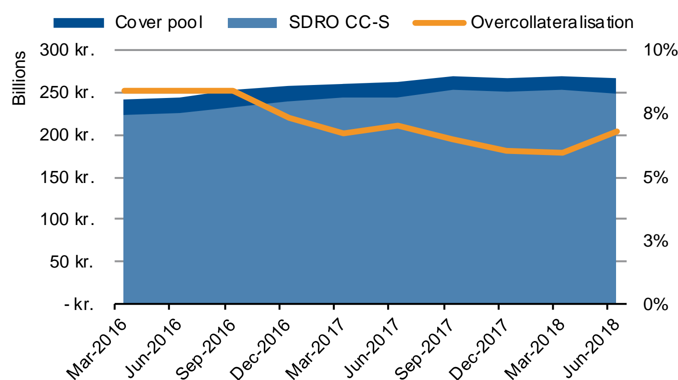
3.4.3. Overcollateralisation

Issuer rating would allow provided overcollateralisation to be fully accounted for

Realkredit's covered bond ratings are wholly supported by fundamental factors and therefore do not rely on the issuer's ability and willingness to provide overcollateralisation above the legal minimum. Current ratings would allow to fully take into account the provided overcollateralisation, however.

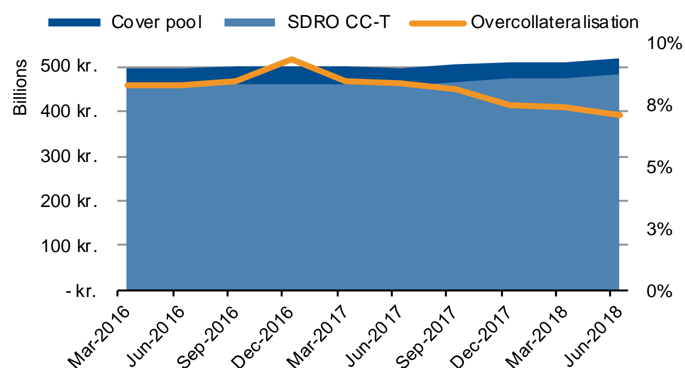
Figure 8: Historical development of overcollateralisation

Capital centre S



Source: Realkredit and Scope

Capital centre T



Source: Realkredit and Scope

Scope is not aware of plans that would significantly change the risk profile or reduce available overcollateralisation to levels that would no longer support the current rating uplift.

3.5. Counterparty risk

The rated covered bonds have counterparty exposures to the issuer, as well as to its parent as loan originator, servicer, bank account provider and paying agent. There are no documented replacement mechanisms that would, for example, automatically shield the covered bonds from a credit deterioration of counterparties providing bank accounts. However, before a regulatory intervention Scope believes that the strong alignment of interests between the bank and covered bond holders will prevent a negative impact from such risks. The bank's risk management process regularly monitors accounts to ensure remedial actions can be implemented early on. Scope also takes a positive view that most collections are done via direct debit, allowing for a relatively swift redirection of payments if needed.

In addition, Scope expects that a regulatory intervention in Realkredit would involve the use of available resolution tools with the aim of maintaining its operations. In such a scenario, Scope does not expect the active management and servicing of the cover pool to be severely impacted.

4. Rating stability

Scope also checks for rating stability depending on the current overcollateralisation, the issuer's credit migration and planned issuances.

4.1. Changes to the issuer assessment

Changes in Scope's assessment of the bank will not directly impact the covered bond ratings

The current covered bond rating is not sensitive to a one-notch downgrade of the issuer rating. Upon an issuer downgrade of more than two notches, cover pool support will become the primary rating factor. In principle, the issuer could maintain the current covered bond rating by increasing the supporting overcollateralisation to a level that allows an additional uplift of up to three notches.

Cover pool support is currently not the primary rating driver. Even so, Scope has established the overcollateralisation levels needed to support the current rating uplift of 1.3% for capital centre S and 2.5% for capital centre T. Aided by the balance principle, a downgrade of the issuer would only slightly increase supporting overcollateralisation to 1.6% and 3.5%, respectively.

If the issuer rating would increase – and implicitely its ability to cover expected losses, available excess spread would still allow to cure credit losses. This would result in a drop of the rating supporting overcollateralisation which effectively would become floored at zero for both capital centres.

4.2. Changes to overcollateralisation

Cover pool support and available overcollateralisation is not a primary rating driver. Scope does not expect current overcollateralisation to constrain the rating, which is also helped by the balance principle, the longstanding prudent issuance strategy, and availability of excess overcollateralisation. This assumption is also supported by the issuer's stable underwriting criteria and the relative stable composition of the capital centres over time.

5. Sovereign risk

Sovereign risk does not limit the ratings of Realkredit's SDROs. Scope believes the risks of an institutional framework meltdown, legal insecurity or currency-convertibility problems, are currently remote[3].

6. Data adequacy

Detailed cover pool and performance data provided by the bank considered by Scope to be of good quality

Scope considers the data quality to be good given the capital centres' high granularity.

Realkredit has provided Scope with both public and confidential information on the capital centres' composition, including asset performance data and vintage information. Based on the detailed asset and liability composition Scope has reconciled the aggregated cash flow profiles provided by the bank. This includes detailed loan-level data with the relevant credit characteristics of the mortgage segment.

If detailed information on some credit aspects was unavailable, Scope benchmarked the bank's information with market data and made conservative assumptions. Scope ensured as far as possible that sources were reliable before drawing upon them but did not verify each item of information independently.

Scope analysts visited Realkredit's offices and interviewed key personnel to understand the bank's origination, monitoring and workout processes. Key trends relevant for the development of the cash flow profile, including issuance plans, were also discussed.

7. Monitoring

Scope will monitor this transaction using information regularly provided by the issuer. The ratings will be monitored and reviewed at least once a year, or earlier if warranted by events.

8. Applied methodology

To analyse the SDROs, Scope applied its Covered Bond Rating Methodology and the General Structured Finance Rating Methodology for the asset and cash flow analysis. All rating methodologies are available on Scope's website, www.scoperatings.com.

[3] Scope's sovereign rating for the Kingdom of Denmark is AAA/ Stable/ A-1+. Click here for the full sovereign rating report.

I. Quantitative covered bond analysis

Credit risk analysis

Realkredit's capital centres are granular enough to apply an inverse Gaussian distribution for assessing the likelihood of defaults. To derive the expected loss Scope used the default distribution coupled with different market scenarios to analyse the cash flows of the SDROs.

Scope's analysed the substitute assets defaults with a non-parametric distribution performing a monte-carlo analysis. The agency assumed a general correlation of 2%, a regional correlation of 5% and an industry-specific (covered bonds) correlation of 20%. A large obligor stress was applied to seven out of eight obligors with an additional correlation of 20%.

For the analysis of the mortgage collateral Scope applied rating-conditional recovery rates as a function of the four-notch distance between the covered bond rating of AAA and the issuer rating of A+. The four-notch stress is the difference between the highest stress scenario of D9 (anchored at the highest achievable rating of AAA) and D5 stresses anchored at the issuer rating. The stress levels are divided into eight levels because fundamental support provides a six-notch uplift and each capital centre provides the maximum three-notch uplift – hence nine stress levels, D0 to D9.

To establish lifetime default rate assumptions, Scope has analysed the bank's delinquency vintage data as well as historical cure rates. Scope has also compared default rates and coefficients of variation observed for granular pools of mortgage loans in other jurisdictions including Germany, Sweden and Austria. For capital centre T the agency applied a higher coefficient of variation than that calculated to account for potential refinancing risk (which may increase default risk among borrowers).

Scope has considered different default timings, from mid-loaded to front-loaded. Back-loaded default scenarios are not as severe for the SDROs because of excess cash build-up and the effect of seasoning on the portfolio.

Rating-conditional security-value haircuts

Scope has calculated the recovery rate on the mortgages by analysing movements in the collateral's market value[4]. The recovery analysis considers the distance to a long-run or sustainable price for the underlying asset, as well as fire-sale discounts, for instance, during a property's foreclosure.

Scope has relied on fundamental recovery analysis because the security represents first-lien claims on the underlying real estate properties. Scope's legal analysis has determined that the security cannot be challenged from a legal standpoint.

Danish residential total security value haircuts

Scope has analysed the current Danish residential property market to derive total security value haircut assumptions for houses and flats in each of five major regions; i) Hovedstaden; ii) Sjælland; iii) Syddanmark; iv) Midtjylland; and vi) Nordjylland. Weekend cottages were grouped with houses; social housing, subsidised housing and cooperative housing with flats.

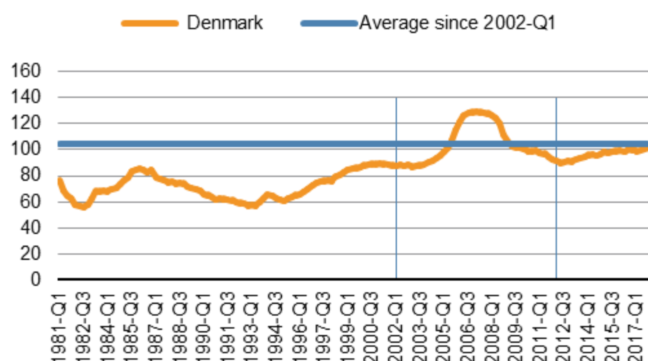
Scope analysed the house price indices provided by Statistics Denmark to derive market value declines. To not overweight a benign phase of the economic cycle, Scope has considered the data from Q1 2002 until Q1 2012 to calculate the sustainable average and volatility as it deems this period to reflect one full cycle.

Using the nominal house price index, indices were deflated using the regional GDP as a deflation factor. From this Scope measured current over/under valuation from the sustainable average in the different regions.

In the most stressful scenario, Scope captures long-observed volatility and current over/under valuations. Scope has derived this volatility stress from the OECD's house price affordability index for Denmark. A volatility of 25.9% was assumed for the scenario that allows the highest credit differentiation, based on the average affordability index value minus two standard deviations.

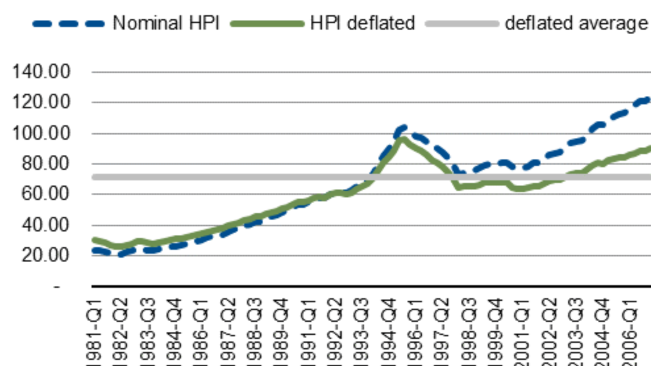
[4] Scope has applied the covered bond analysis framework but also took recourse to the General Structured Finance Methodology to establish the market value haircuts and the rating-conditional recovery assumptions.

Figure 9: Affordability index



Source: OECD and Scope

Figure 10: House price index (HPI) – Denmark



Source: Statistics Denmark and Scope

Market value declines for D9 and D0 levels are as follows

Market value decline (D9) = 1 – (1 – D9 volatility adjustments) * (Regional over/under valuation)

Market value decline (D0) = Regional over/under valuation

Based on comprehensive data provided by the issuer Scope has derived fire-sale discounts ranging between 18% and 31%, depending on the region and type of the property. Fire-sale discounts reflect Scope's expectation that certain properties will be sold under non-standard market or distressed conditions due to factors such as asset deterioration or insufficient competition in the auction process.

Total security value haircut assumptions were derived based on the following equation:

Total security value haircut = 1- (1- Market value decline) * (1-Fire-sale discount)

Scope has derived intermediate rating stresses through a linear interpolation between D0 and D9 scenarios.

Figure 11: Total security value haircuts for flats

Flats	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Hovedstaden	52.5%	50.6%	48.6%	46.7%	44.7%	42.8%	40.8%	38.9%	36.9%	35.0%
Sjælland	47.5%	45.6%	43.6%	41.7%	39.7%	37.8%	35.8%	33.9%	31.9%	30.0%
Syddanmark	47.5%	45.3%	43.1%	40.8%	38.6%	36.4%	34.2%	31.9%	29.7%	27.5%
Midtjylland	52.5%	50.6%	48.6%	46.7%	44.7%	42.8%	40.8%	38.9%	36.9%	35.0%
Nordjylland	62.5%	61.1%	59.7%	58.3%	56.9%	55.6%	54.2%	52.8%	51.4%	50.0%

Source: Scope

Figure 12: Total security value haircuts for houses

Houses	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Hovedstaden	42.5%	40.3%	38.1%	35.8%	33.6%	31.4%	29.2%	26.9%	24.7%	22.5%
Sjælland	50.0%	48.1%	46.1%	44.2%	42.2%	40.3%	38.3%	36.4%	34.4%	32.5%
Syddanmark	50.0%	48.1%	46.1%	44.2%	42.2%	40.3%	38.3%	36.4%	34.4%	32.5%
Midtjylland	52.5%	50.6%	48.6%	46.7%	44.7%	42.8%	40.8%	38.9%	36.9%	35.0%
Nordjylland	57.5%	55.8%	54.2%	52.5%	50.8%	49.2%	47.5%	45.8%	44.2%	42.5%

Source: Scope

Additional security value haircuts such as illiquidity adjustments for large properties were not considered as they were already subject to the data sample provided.

Danish commercial total security value haircuts

To determine security value haircuts for the commercial market Scope followed the same rationale as for residential haircuts for Danish mortgage loans. This market was split into i) business properties, including retail, office, and others; ii) industrial; and iii) agricultural.

In order to derive any over/undervaluation in the respective market Scope has defined one economic cycle to fall between Q1 2007 and Q1 2014. A resulting undervaluation was given a floor of zero. In the absence of house price affordability data on commercial properties, volatility was also measured based on deflated price indices. The calculated volatility is 37% on average. The fire-sale discount based on the data provided ranges between 34% for business properties and 46% for industrial properties. This results in the following commercial security value haircuts.

Figure 13: Total security value haircuts for houses

Commercial	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Business	67.5%	64.4%	61.4%	58.3%	55.3%	52.2%	49.2%	46.1%	43.1%	40.0%
Industrial	65.0%	62.8%	60.6%	58.3%	56.1%	53.9%	51.7%	49.4%	47.2%	45.0%
Agricultural	60.0%	57.2%	54.4%	51.7%	48.9%	46.1%	43.3%	40.6%	37.8%	35.0%

Source: Scope

For commercial properties in capital centres S and T in Sweden or Norway Scope has assumed base case (D0) haircuts of 65% and 80% in a stressed scenario (D9); intermediate scenarios were linearly interpolated.

Other parameters

Based on the composition of the capital centres, Scope has applied segment-specific recovery rates for residential, commercial and substitute assets. Scope also based the relevant average liquidity premium on the composition. The highest stress assumptions only apply in the scenarios which, if passed, allows Scope's maximum credit differentiation between the issuer and its covered bonds.[5]

Liquidity premium. Scope has applied 150bps as an additional and most stressful liquidity premium to discount Danish residential mortgage loans, and 300bps for the respective commercial segment. The liquidity premium was determined by analysing the historical trading spreads of Danish mortgage covered bonds denominated in either euros or Danish kroner.

Market risk stresses. In the cash flow analysis Scope has assumed deterministic interest rate and foreign exchange stresses, applying a common framework to establish the stresses. This allows Scope to establish stresses that equate to the maximum achievable rating uplift.

Interest rate analysis. Scope has tested the rated SDROs against several scenarios of rising and falling interest rates. Both covered bond programmes are the most sensitive against rising interest rate scenarios. The capital centre S programme is most sensitive to a scenario in which interest rates rise after two years and plateau at 10%; capital centre T is most sensitive to rate rises that plateau at 10% after 10 years. For other rate scenarios tested refer to the covered bond methodology.

Foreign-exchange risk analysis. Based on the scenario analysis framework in the methodology, Scope has established and tested the capital centres' sensitivity to foreign exchange rate stresses. Capital centre S is exposed to an appreciation of Danish kroner against its other currencies because substitute assets held in Swedish and Norwegian kroner are not funded with outstanding bonds. In the most stressful scenario this incorporates devaluations of 26% (Swedish kroner) and 32% (Norwegian). Scope has incorporated a devaluation stress of the euro against the Danish kroner of 7% despite the latter is almost being pegged to the former. Capital centre T is exposed to a depreciation of Danish kroner against its other currencies even though asset and liabilities have a near-perfect natural hedge with each other. However, there is an open position with assets written down by losses; therefore, foreign currency liabilities exceed foreign currency assets. In this case Scope has assumed an appreciation of 35.5% (Swedish kroner), 25% (Norwegian kroner) and 7% (euro).

[5] The maximum credit differentiation between the rating of the issuer and its covered bonds is typically determined by Scope's fundamental assessment of the legal and resolution framework. Scope's methodology sets out that the maximum credit differentiation can only be three notches higher than this fundamental uplift. For the issuing bank, Scope has determined a fundamental support of six notches. According to Scope's methodology, the maximum uplift is seven notches (6+3).

Prepayment rate assumptions. Scope has tested constant prepayment rate assumptions of 0% and 20% for all cover assets. The negative weighted average maturity in combination with a high constant prepayment rate results in the most stressful scenario, primarily due to the loss of excess spread.

Servicing fee. Scope has applied country- and asset-type-specific servicing fees to be paid by the cover pool annually. For the respective segments in Realkredit's capital centres Scope has applied a residential servicing fee of 25bps, commercial fee of 50bps and 10bps for the substitute assets. The weighted average annual servicing fee used is 27bps for capital centre S and 32bps for capital centre T.

II. Summary of covered bond characteristics

Reporting date	31 March 2018	31 March 2018
Issuer name	Realkredit Danmark A/S	
Capital centre	S	T
Country	Denmark	
Covered bond name	særligt dækkede realkreditobligationer (SDROs) Danish mortgage covered bonds issued under the Danish mortgage act (Specific balance principle)	
Covered bond legal framework	Danish legal covered bond framework	
Cover pool type	Mortgage loans	Mortgage loans
Composition	Residential = 72.3% Commercial = 21.3% Substitute = 6.4%	Residential = 56.3% Commercial = 37.0% Substitute = 6.6%
Issuer rating	A+/NA[1]	A+/NA[1]
Current covered bond rating	AAA/Stable	AAA/Stable
Covered bond maturity type	Hard bullets[2]	Hard bullets[2]
Cover pool currencies	DKK (99.8%) EUR (0.2%) SEK (0.0%)	DKK (93.6%) SEK (3.0%) EUR (2.7%) NOK (0.7%)
Covered bond currencies	DKK (99.9%) EUR (0.0%)	DKK (93.3%) SEK (3.1%) EUR (2.8%) NOK (0.8%)
Fundamental cover pool support (notches)	6	6
Maximum achievable covered bond uplift (notches)	9	9
Potential covered bond rating buffer	5	5
Cover pool (DKK m)	269,261	508,320
Covered bonds (DKK m)	254,212	472,985
Substitute assets (DKK m)	15,049	35,335
Current overcollateralisation/ Legal minimum overcollateralisation	5.9% / 8%[3]	7.5% / 8%[3]
Overcollateralisation to support current rating	1.30%	2.50%
Overcollateralisation to support current rating upon a one-notch issuer downgrade	1.60%	3.50%
WA seasoning	2.4 years	4.6 years
Duration/ Weighted average maturity of assets	9.06/ 13.17	9.85/ 14.26
Duration/ Weighted average maturity of liabilities	9.58/ 13.82	10.82/ 15.45
Duration gap/ Weighted average maturity gap	-0.52/ -0.65	-0.97/ -1.19

Reporting date	31 March 2018	31 March 2018
Capital centre	S	T
Number of exposures	165,768	263,314
Average loan size (in DKK '000s)	1,236	1,253
Top-10 exposures	1.9%	4.7%
Top-20 exposures	3.1%	7.0%
Interest rate type – assets (fixed/floating)	96.8%/ 3.2%	6.9%/ 93.1%
Interest rate type – liabilities (fixed/floating)	98%/ 2%	78.9%/ 21.1%[5]
Weighted average LTV (whole loan LTV)	63%	62%
Geographic split (top 3)	Greater Copenhagen (42.3%) South Denmark (17.9%) Central Denmark (17.7%)	Greater Copenhagen (40.5%) South Denmark (17.1%) Central Denmark (17.0%)
Default measure	Inverse Gaussian/ Non-Parametric	Inverse Gaussian/ Non-Parametric
Weighted average default rate (mortgage/substitute)	3.1%/ 0.11%	2.6%/ 0.11%
Weighted average coefficient of variation (mortgage/substitute)	50%/ 1375%	75%/ 1389%
Weighted average recovery assumption (D0/D9)[1]	89.2% / 72.5%	87.9% / 69.3%
Share of loans > three months in arrears (NPL)	0.09%	0.46%
Interest rate stresses (max./min.; currency-dependent)	-1 to 10%	-1 to 10%
FX stresses (max./min.; currency-dependent)	26% / -36%	26% / -36%
D9[1] liquidity premium	150bps/ 300bps	150bps/ 300bps
Servicing fee (mortgage)	27bps	32bps

[1] Issuer rating is currently under review for upgrade.
[2] Covered bonds issued after 2014 can be extended in the case that refinancing fails.
[3] 8% of overcollateralisation are calculated based on risk-weighted assets; Realkredit applies an internal rating-based risk weighting.
[4] D0 or D9 denote the stresses commensurate with the rating distance between the issuer rating and the covered bond ratings.
[5] Fixed rate bonds are refinanced regularly reflecting the reset cycles of the mortgage loans thereby reducing the interest rate mismatch.

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