



Danish covered bonds

Nykredit

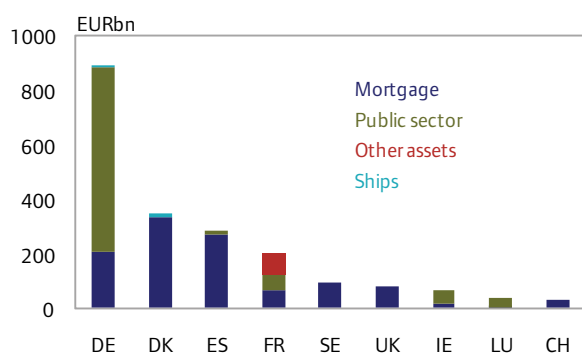
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Introduction

- The Danish covered bond market is Europe's second largest
- The size of the Danish covered bond market is EUR 320bn
- Danish covered bonds are both CRD and UCITS compliant
- Denmark pursues a fixed-exchange rate policy vis-à-vis the euro
- Pass-through on a loan-by-loan basis
- Refinancing risk is passed through directly to borrowers or eliminated by long-term funding

Figure 1: Europe's second largest covered bond market



The size of the Danish covered bond market compared with corresponding European covered bond markets

Source: ECBC 2008

Danish covered bonds

This publication is aimed at investors, analysts and others with an interest in the Danish mortgage system. "Danish covered bonds" is prepared by Nykredit and is regularly updated with structural changes. This edition includes a description of the latest issuer initiatives, an update on the products offered in the Danish covered bond market, and a more detailed description of investor security on investment in Danish covered bonds.

The Danish system contains several special features designed to support and enhance the credit strength of Danish covered bonds. In many ways, the legal and institutional framework has been the basis for the efficiency and success of Danish mortgage finance and is probably the foremost reason for the notably long and unblemished history of specialised lending in Denmark.

In the wake of the global mortgage lending crisis, the Danish system has received international acknowledgement, and several countries are considering implementation of parts of the Danish mortgage market structures and mechanisms.

Europe's second-largest covered bond market

The Danish and German covered bond markets are Europe's oldest. The first Danish mortgage bonds date back more than 210 years to the period after the Copenhagen Fire of 1795, which left a huge finance need for reconstruction. Throughout its long history, the Danish mortgage regime has never caused bondholders any losses as a result of a payment default. This underscores the high degree of security built into the system.

Due to the long Danish tradition of using mortgage loans to finance real property, the Danish covered bond market is with an outstanding amount of more than EUR 320bn one of the largest in Europe – second only to the German Pfandbrief market.

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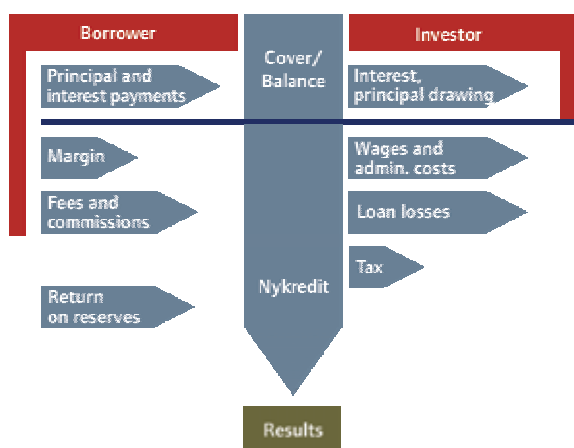
nykredit.com/ir or nykreditmarkets.com

Compared with most other European mortgage systems, the Danish system stands out in a number of areas. The biggest difference that leaps to the eye is the close link between lending and funding in Denmark

Despite the balance principle liberalisation in July 2007, Danish issuers are still subject to very strict ALM rules, and Danish mortgage banks continue offering only true pass-through products. Danish mortgage banks thereby completely eliminate market risk as the issued bonds match the loans granted.

The linking of lending and funding has made the Danish mortgage system unique compared with other European mortgage systems.

Figure 2: The Danish pass-through balance principle



The pass-through system means that issuers pass through all interest and principal payments from borrowers directly to bondholders.

Source: Nykredit

The amendment of the revised Danish mortgage legislation in 2007 also meant the end of the specialised banking principle. Danish mortgage banks consequently lost their exclusive right to issue bonds against mortgages on real property. Commercial banks may now, subject to approval by the Danish FSA, issue bonds subject to either the pass-through system or a balance principle more along the lines of other European covered bond systems.

Denmark is not part of the euro area, and the majority of issues are DKK-denominated. The Danish krone is pegged to the euro as the Danish central bank, Danmarks Nationalbank, pursues a fixed-exchange rate policy, thereby reducing the importance of the foreign exchange component when investing in Danish covered bonds.

UCITS and CRD compliant

Danish mortgage bonds issued subject to both new and former legislation qualify as covered bonds, cf Article 22(4) of the EU Investment Funds Directive, UCITS.

- Issued by credit institutions within the EU
- The proceeds from the issuance of bonds must be invested in assets (loans) the cash flows of which must be adequate to meet the obligations to bondholders throughout the maturity of the bonds
- Investors have a preferential right to the mortgages created as security for the bonds in case of the insolvency of an issuer
- Issuers are subject to regulatory supervision (by the Danish Financial Supervisory Authority)

By virtue of their classification as covered bonds, Danish mortgage bonds generally enjoy a low risk weighting of 10% in accordance with the standardised approach when held by banks or credit institutions within the EU. For non-EU investors, covered bonds will typically be subject to a 20% risk weighting in accordance with the standardised approach.

SDRO, SDO and RO

The EU Capital Requirements Directive (CRD) lays down a number of requirements for mortgage bonds to qualify as covered bonds and obtain a low risk weighting. One of the most significant elements of the CRD is the stricter requirement for the valuation of cover assets and the requirement of continuous loan-to-value (LTV) compliance.

The purpose of the revised Danish mortgage act that took effect on 1 July 2007 was in part to ensure that Danish mortgage bonds would continue to qualify as covered bonds under the tight EU Capital Requirements Directive (CRD) requirements.

Covered bonds issued under the former legislation ("realkreditobligationer" – ROs) do not fulfil the CRD requirement of continuous LTV compliance. However, the CRD grandfathering clause secures ROs covered bond status and a 10% risk weighting provided issuance has ceased no later than by end-2007. ROs issued later than by end-2007 have a risk weighting of 20%. In replacement of ROs, Danish mortgage banks have opened bond series (of either SDOs – "særligt dækkede obligationer", ie covered bonds, or SDROs – "særligt dækkede realkreditobligationer", ie covered mortgage bonds) that meet the stricter CRD requirements and qualify as covered bonds. SDOs and SDROs are issued as pass-through fixed-rate bullets, callable bonds, floaters and capped floaters by the mortgage banks.

Nykredit aims to provide its investors and other interested parties with relevant, reliable and accurate information. For more information, please visit our website or contact us directly.

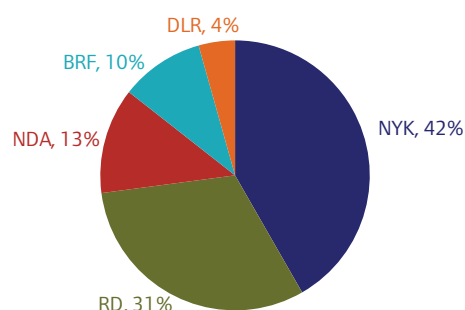
Nykredit, September 2009

- A relatively small number of mortgage banks account for nearly all Danish covered bond issues
- Danish covered bonds are generally issued on tap or by auction
- The covered bond programmes from the three largest mortgage bond issuers are all rated Aaa

Issuers

Danish covered bond issuers are subject to licensing by the Danish Financial Supervisory Authority (FSA). Formerly, only specialised mortgage banks could obtain a licence, but on 1 July 2007 commercial banks also became eligible for licensing as covered bond issuers. Mortgage bank issuers account for nearly all Danish covered bond issues, and the mortgage bank market is characterised by a relatively small number of issuers: Nykredit Realkredit A/S (NYK), Realkredit Danmark A/S (RD), Nordea Kredit Realkreditaktieselskab (NDA), BRFkredit A/S (BRF), DLR Kredit A/S (DLR) and LR Realkredit A/S (LR). At September 2009, Danish mortgage bank issuers had issued covered bonds worth EUR 320bn. Figure 1 below shows the bond debt outstanding by issuer.

Figure 3: Danish covered bond market (bond debt outstanding)



The Danish covered bond market by issuer. Nykredit includes Totalkredit. September 2009.

Source: Nykredit

With a market share of 42%, Nykredit is the leading issuer followed by Realkredit Danmark and Nordea Kredit. Nykredit, Realkredit Danmark, BRFkredit and Nordea Kredit offer mortgages for all types of property, while the remaining mortgage banks focus on a limited property segment. Totalkredit, which exclusively grants private residential mortgages, is a subsidiary of Nykredit.

Realkredit Danmark and Nordea Kredit are subsidiaries of the commercial banks Danske Bank and Nordea Bank Danmark, respectively. By contrast, Nykredit and BRFkredit are independent mortgage banks with mortgage banking as their core business.

DLR Kredit is a specialised mortgage bank which chiefly offers mortgage loans to agriculture and other commercial properties. Nordea Kredit and Realkredit Danmark serve customers from the branch networks of their parent companies and also cooperate with estate agency chains. Nykredit has a similar strategic alliance with local and regional banks in Denmark which refer new customers to Nykredit under the Totalkredit brand. In addition, Nykredit is franchiser of the estate agency chain Nybolig and cooperates with the estate agency chain Estate. Correspondingly, BRFkredit cooperates with the estate agency chain EDC.

Loans are granted primarily against mortgages on Danish owner-occupied dwellings. Approximately 60% of all Danish mortgage loans issued are secured on owner-occupied dwellings. Danish covered bonds are almost entirely secured on domestic properties. However, some mortgage banks, including Nykredit, offer mortgage loans secured on properties outside Denmark. International lending activities require specific FSA approval. These activities, however, are limited in scope. In Nykredit's case, international lending only accounts for 3% of the outstanding loans.

New issuers

Under the revised Danish covered bond legislation, commercial banks may retain mortgage loans in their own balance sheets and fund them with covered bonds. As the first commercial bank in Denmark, Danske Bank launched a covered bond programme totalling EUR 15bn in September 2009.

Types of covered bond issuance in Denmark

Danish covered bonds are generally issued in three different ways, either on tap, by auction or as block issues.

The recent turmoil in international financial markets has not had a significant impact on issuance in the Danish covered bond market. One reason for this is no doubt the extensive use of tap issues. Tap issues satisfy day-to-day funding needs, and issuers thereby avoid having to sell large amounts in the market in one single day. Furthermore, as nearly all lending is based on pass-throughs, higher funding costs do not affect issuers but are passed directly to borrowers. Finally, the portfolio of loan products is determined by the development in the funding market.

Covered bonds under the pass-through system are usually issued on tap. Long-term callable bonds and long-term capped floaters typically have an opening period of three years with tap issuance on a day-to-day basis. The relatively long opening period enables issuers to build bond series with sizeable outstanding amounts.

The refinancing of ARMs funded by short-term fixed-rate bullets takes place through auctions – mainly in December. The auctions give rise to major issuance of especially 1Y fixed-rate bullets. For more details, please refer to "Fixed-rate bullets" overleaf.

Types of Danish covered bond issues:

Tap:

Bonds issued as pass-throughs on a day-to-day basis

Auction:

For refinancing of ARMs (adjustable-rate mortgages) mainly in December every year. Large amounts of primarily DKK fixed-rate bullets are sold on auction

Block:

Typically benchmark euro-denominated covered bonds. Block issues are mainly used for funding in commercial banks.

Danish covered bonds have high ratings

Danish covered bond issuers are all rated by Moody's Investors Service. The covered bond programmes of the three largest mortgage bond issuers (Nykredit, RD and Nordea) are all rated Aaa.

In addition to Aaa ratings of the largest covered bond programmes, the Danish issuers are the only ones in Europe that are also categorised as "Very High" in terms of Moody's Timely Payment Indicator (TPI).

Moody's Timely Payment Indicator (TPI):

The TPI is Moody's assessment of the likelihood that timely payment is made to covered bond holders following Sponsor Bank Default. The TPI determines the maximum rating a covered bond programme can achieve with its current structure while allowing for a reasonable amount of overcollateralisation.

Source: Moody's Investors Service

The Nykredit Group

At September 2009, 95% of all covered bonds issued by the Nykredit Group were Aaa/AAA rated.

Nykredit's Capital Centre E was opened in the autumn of 2007 in connection with Nykredit's transition to the revised Danish covered bond framework. Capital Centre E issues Nykredit's covered bonds, which are also Aaa/AAA rated.

In accordance with CRD requirements, Danish SDO legislation stipulates that mortgage banks must provide supplementary capital to bond investors if the value of mortgaged properties decreases, and the LTV ratios of the loans exceed the stipulated LTV limits. This requirement applies on a permanent basis to SDOs, but not to ROs. As a result of the SDO legislation, Nykredit may issue so-called junior covered bonds, using the proceeds to provide supplementary security for loans secured on properties that are subject to considerable price declines.

Table 1: Moody's rating of Danish covered bond issuers

Issuer	Unsecured rating	Covered bond rating
Danske Bank	Aa3	Aaa
- Realkredit Danmark (RD)	-	Aaa
Nykredit Realkredit	A1	Aaa
- Nykredit Bank	A1	
Nordea Bank	Aa2	
- Nordea Kredit	-	Aaa
BRF	Baa1	Aa1
DLR	A1*	Aa1

Danish issuers are the only ones in Europe in the "Very high" category of Moody's Timely Payment Indicator, meaning that an issuer rating downgrade by 1 notch will not automatically affect the Aaa rating of the covered bond programmes.

* Under review for possible downgrade, September 2009

Source: Moody's, Bloomberg

As of March 2009, Nykredit introduced two-tier mortgaging for the financing of commercial properties. In future, all new lending secured on commercial properties will be funded with a combination of covered bonds (SDO) and traditional mortgage bonds (RO). The top part of new loans secured on commercial properties will be funded by the issuance of ROs out of a newly opened Capital Centre G. The remaining funding is obtained through the issuance of SDOs. The need to provide supplementary security for loans based on SDOs is hereby reduced significantly. Capital Centre G will have no rating.

Nykredit's Capital Centre G was opened in 2009. Capital Centre G is used for two-tier mortgaging.

Totalkredit, a mortgage bank wholly-owned by the Nykredit Group, offers mortgage loans through a close alliance with Danish local and regional banks. Since autumn 2005, the Nykredit Group has funded Totalkredit's lending by issuing bonds out of Nykredit Realkredit. This provides large and highly liquid bond series to the advantage of both borrowers and investors.

By way of intercompany funding, Totalkredit's lending is funded by covered bonds issued out of Nykredit Realkredit's Capital Centre E. Under this model, Totalkredit acts strictly as a pass-through leg exclusively arranging for cash flows between borrowers and Nykredit Realkredit. Nykredit Realkredit subsequently ensures that all payments to investors are effected.

Totalkredit's lending remains in its balance sheet despite the fact that the bonds are issued by Nykredit Realkredit. Totalkredit and Nykredit Realkredit's asset-liability matches are obtained by way of intercompany master securities. These securities reflect the

underlying loans and bonds in detail, and all have Totalkredit as debtor and Nykredit Realkredit as creditor.

Table 2: Nykredit Group ratings

Nykredit Realkredit A/S	Moody's	Standard & Poor's
Capital Centre E (covered bonds, SDO)	Aaa	AAA
Capital Centre E (junior covered bonds, JCB)	Aa2	-
Capital Centre D (covered bonds, RO)	Aaa	AAA
Capital Centre C (covered bonds, RO)	Aa1	AAA
Nykredit in General (covered bonds, RO)	Aa1	AAA
Capital Centre G (covered bonds RO)	-	-
Short, unsecured rating	P-1	A-1
Long, unsecured rating	A1	A+
Subordinate loan capital (Tier 2)	A2	-
Hybrid core capital (Tier 1)	A3	-
Totalkredit A/S		
Capital Centre C (covered bonds, RO)	Aaa	AAA
Nykredit Bank A/S		
Short-term deposit rating	P-1	A-1
Long-term deposit rating	A1	A+
Bank Financial Strength Rating	C-	
Euro MTN Program		
- Short-term senior debt maturing on 30 September 2010 at the latest	P-1	A-1+
- Short-term senior debt maturing after 30 September 2010	P-1	A-1
- Long-term senior debt maturing on 30 September 2010 at the latest	Aaa	AAA
- Long-term senior debt maturing after 30 September 2010	A1	A+
- Subordinate loan capital (Tier 2)	A2	A-
- Hybrid core capital (Tier 1)	A3	A-
Euro Commercial Paper and Certificate of Deposit Program		
- Short-term senior debt maturing on 30 September 2010 at the latest	P-1	A-1+
- Short-term senior debt maturing after 30 September 2010	P-1	A-1

Ratings at September 2009.

Source: Nykredit

More on the intercompany funding model:

nykredit.com/ir

The Danish covered bond market

- Outstanding amount of more than EUR 320bn
- The market falls into three overall segments: callable bonds, fixed-rate bullets and floaters
- The buyback option is a unique Danish feature

In outline

Mortgage bonds account for the vast majority of the Danish bond market. In September 2009 this market had an outstanding amount of more than EUR 320bn compared with a government bond market with an outstanding amount of about EUR 65bn. As the leading issuer, Nykredit alone has an outstanding amount of Danish covered bonds worth around EUR 130bn.

Table 3: Outstanding amount of Danish bonds, September 2009

Segment	EURbn	%
Government bonds	66	17%
Mortgage bonds	326	83%
- Callables, DKK	112	29%
- Fixed-rate bullets, DKK	122	31%
- Fixed-rate bullets, EUR	19	5%
- Floaters, DKK	22	6%
- Floaters, EUR	9	2%
- Capped floaters, DKK	32	8%
- Index-linked bonds, DKK	9	2%
Total	392	100%

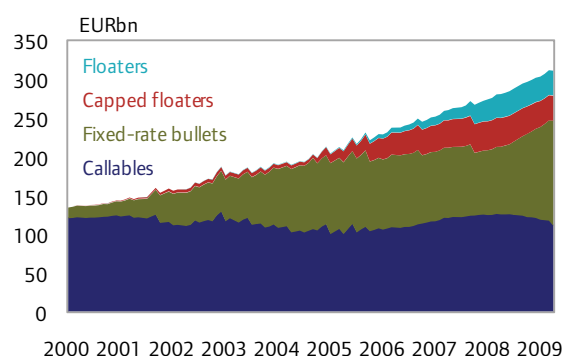
Callable bonds and fixed-rate bullets make up the leading segment of Danish mortgage bonds. Hardly any Danish index-linked bonds have been issued for the past 10 years following amended tax rules.

Source: Nykredit

The Danish mortgage bond market falls into three overall segments: callable bonds, fixed-rate bullets and floaters (with and without caps). As shown in Table 3, callable mortgage bonds and fixed-rate bullets constitute the greater part of the market. Euro-denominated bonds make up about 9% of the Danish mortgage bond market, with the highest volume in the fixed-rate bullet segment.

The market trends prevailing from 2000 to 2005 suggested that the fixed-rate bullet segment would become the leading bond segment and consequently overtake the callables segment. A steep yield curve motivated many borrowers to refinance into ARMs (adjustable-rate mortgages), which are typically funded by short-term fixed-rate bullets. As depicted in Figure 4, the callables segment grew significantly from 2005 to 2008 due to the yield curve flattening. Concurrently with the post-2008 steepening of the yield curve, issuance has primarily been concentrated in fixed-rate bullets, and due to massive issuance, their outstanding amount has now exceeded outstanding fixed-rate callables.

Figure 4: Different mortgage bond segments



Development in major mortgage bond segments.

Source: Nykredit

Table 4 shows the 20 largest bond series in the Danish mortgage bond market, of which the smallest series has an outstanding amount of EUR 2.8bn. The largest series are RD's and Nykredit's fixed-rate bullets maturing in January 2010. These two bonds alone have an outstanding amount of EUR 37.4bn. Issuers strive to issue benchmark bonds of uniform properties.

Table 4: The 20 largest bond series, September 2009

ISIN	Name	Segment	Amount EURbn
DK0009276198	4% RD Jan 2010	Fixed-rate bullet	22.0
DK0009767097	4% NYK Jan 2010	Fixed-rate bullet	15.4
DK0002017318	4% NDA Jan 2010	Fixed-rate bullet	9.6
DK0009367310	4% BRF Jan 2010	Fixed-rate bullet	6.4
LU0392002951	5% NYK LUX Jan 2010	Fixed-rate bullet	5.7
DK0006325469	4% DLR Jan 2010	Fixed-rate bullet	5.3
DK0009763260	5% NYK 2038	Callable	4.5
DK0009272957	5% RD 2038 IO	Callable	4.5
DK0009760167	5% NYK 2038 IO	Callable	4.4
DK0009765711	1.2116% NYK 2018	Floater	4.3
LU0395665754	5% RD LUX Jan 2010	Fixed-rate bullet	4.1
DK0009772840	4% NYK Apr 2010	Fixed-rate bullet	4.0
DK0009771958	4% NYK Oct 2009	Fixed-rate bullet	3.6
DK0002014489	5% NDA 2038 IO	Callable	3.5
DK0009262990	4% RD Jan 2010	Fixed-rate bullet	3.2
DK0009270233	4% RD 2035	Callable	3.2
LU0396564691	5% DLR LUX Jan 2010	Fixed-rate bullet	3.0
DK0009269227	5% RD 2035	Callable	2.8
DK0009276271	4% RD Jan 2011	Callable	2.8
DK0009272874	5% RD 2038	Fixed-rate bullet	2.8

The 20 largest bond series, September 2009.

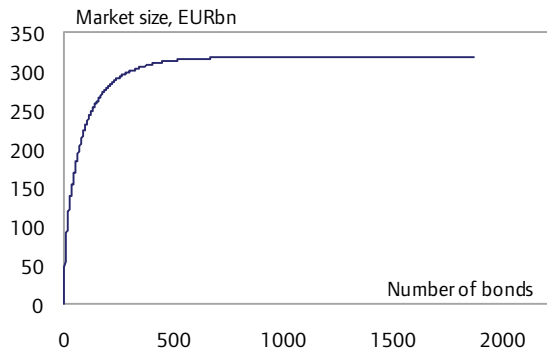
Source: Nykredit

The secondary market for 30Y callable 5% annuity bonds operates as a unified market. This means that bonds from different issuers trade at the same prices. Investors may buy a 5% 2041 bond without specifying the issuer. The unified market structure fosters liquidity and transparency in the Danish mortgage bond market.

A market concentrated in a few bond series

The Danish mortgage market comprises relatively few bond series. Although there are nearly 2,000 different bond series in the market, the 100 largest series represent some EUR 210bn equal to 65% of the entire market.

Figure 5: Market by outstanding amount, September 2009



The 100 largest bond series make up 65% of the market.

Source: Nykredit

The delivery option

Due to the pass-through principle, Danish mortgage borrowers may terminate their loans by buying back the mortgage bonds funding their loans in the bond market and delivering them to the mortgage bank. The option is referred to as the delivery option or the buyback option and applies to all mortgage bonds whether callable or non-callable. The buyback option is a unique feature of the Danish mortgage finance system. Where fixed-rate callable mortgage loans, floating-rate mortgage loans or adjustable-rate mortgage loans subject to annual refinancing are concerned, there is a one-to-one relationship between the ISIN and the loan. Adjustable-rate mortgage loans refinanced at intervals exceeding one year are funded through a basket of fixed-rate bullet bonds reflecting the loan's repayment and interest reset profile. Each borrower therefore always knows the ISIN(s) of the bonds behind

his/her mortgage loan. The buyback option constitutes a significant difference between the US and the Danish mortgage finance system. The US system only allows mortgage loan prepayment at par (100).

Research and quotes

Both foreign and domestic investors demand in-depth research on the Danish mortgage bond market. Nykredit Markets meets this demand by developing pricing models and offering a number of ways to access relevant key figures. Nykredit Markets updates and distributes a number of central key figures on benchmark bonds via Reuters, Bloomberg and the internet on a daily basis. Reuters and Bloomberg also provide updated prices on Danish benchmark government and mortgage bonds as well as research papers and key indicators on the Danish economy.

Investors seeking an overview of spreads and returns on Danish mortgage bonds may avail themselves of the Nykredit Danish Mortgage Bond Index, which gives a good impression of the development in the performance of Danish mortgage bonds. The index is published daily on Nykredit Markets's website, nykredit-markets.com, as well as by Bloomberg (NYKR) and Reuters (.NYKI). For more details, see "Nykredit's mortgage bond indices", page 35.

Table 5: Quotes and key figures

Reuters	Bloomberg
Nykred12 (callables)	NYKP<GO>
Nykred16 (bullets)	NYKP<GO>

Nykredit Markets quotes prices on benchmark mortgage bonds through Reuters and Bloomberg. Key figures and indices are available at nykreditmarkets.com. At Bloomberg, you can also view data on the Nykredit Danish Mortgage Bond Index as well as historical performance data.

Source: Nykredit

Details

Bond prospectuses and fact sheets providing detailed descriptions of the individual bond types issued by Nykredit and To-talkredit are available for download at nykredit.com/ir and Nykredit's Bond Data webpages contain debtor distributions, cash flows, drawings and prepayment data. See also "Market data" below.

Table 6: Outline of main bond types (open for issuance)

Fixed-rate callables	Fixed-rate bullets	Floaters (capped and uncapped)
<ul style="list-style-type: none"> Fixed-rate callable bonds DKK-denominated (mainly) Maturities: 10, 15, 20 and 30 years Annuities with or without interest-only options (interest-only period of a maximum of 10 or 30 years) Daily tap issuance depending on the lending activity Used to fund fixed-rate callable annuity loans until expiry of the loan term with or without interest-only options Opening periods of typically three years 	<ul style="list-style-type: none"> Fixed-rate non-callable bullet bonds DKK- and EUR-denominated Maturities: 1–10 years Daily tap issuance combined with... auctions in March, September and December Used to fund adjustable-rate annuity loans up to the interest rate reset day Open for issuance until maturity 	<ul style="list-style-type: none"> Capped or uncapped floating rate bonds DKK- and EUR-denominated Maturities: 5, 10, 20 and 30 years Annuities with or without interest-only options (interest-only period of a maximum of 10 or 30 years) Coupon typically based on 3M or 6M Cibur or Euribor plus fixed spread subject to semi-annual or quarterly coupon fixing Typically with a prepayment option at a price of 105 on capped floaters A few of the uncapped floaters are callable either at par (100) or at a price of 105 Daily tap issuance combined with auctions in December Used for funding capped or uncapped floating-rate mortgage loans with or without interest-only options

Danish mortgage bonds can basically be grouped into three types: fixed-rate callables, fixed-rate bullets and floaters.

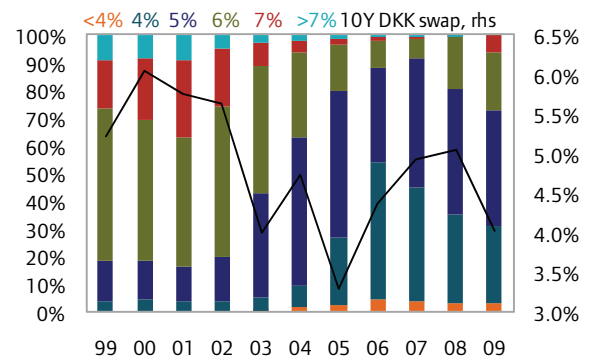
Source: Nykredit

FIXED-RATE CALLABLE BONDS

The callable bond market is the second largest mortgage bond segment in Denmark. The market consists mainly of 20Y and 30Y fixed-rate bonds with coupons from 4% to 7%. The bonds have four annual payment dates (except certain old series). Some callable annuity bonds have interest-only (IO) options. From 2003 to 2007, IO bonds were issued with IO periods of up to 10 years. However, the mortgage legislation amendments passed in 2007 allowed for longer IO periods.

Callable bonds are callable at par by borrowers. In case of falling interest rates, borrowers may exercise their prepayment option by giving the mortgage bank notice of prepayment at least two months before the payment date on which the borrower wishes to prepay a loan. Mortgage banks calculate prepayments, which are paid to investors on a proportionate basis on the subsequent payment date.

Borrowers exercise their right to prepay loans to a great extent. Figure 6 shows how the falling interest rates in the period from 2001 to 2005 led to almost 100% prepayment. In 2001 the market consisted chiefly of 6% and 7% bonds. In 2005 these bonds had been prepaid, and the market subsequently consisted almost exclusively of bonds with 4% and 5% coupons.

Figure 6: Callable bond coupons

Danish borrowers exercise their prepayment rights on a large scale in periods with low interest rates.

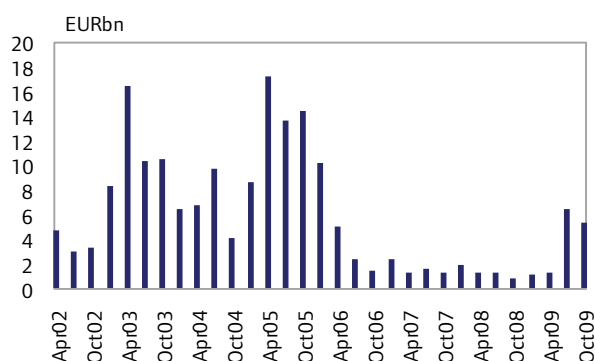
Source: Nykredit

Concurrently with renewed interest rate rises from 2005, issuance shifted from 4% bonds to 5% bonds to 6% bonds and finally to 7% bonds. When interest rates dropped again in 2008, issuance shifted back to 6% bonds and then to 5% bonds, and 7% bonds were prepaid. Thus, the past eight years clearly illustrate the dynamics of the Danish mortgage bond market. Borrowers typically opt to issue callable bonds trading close to par, as these

offer the best chances of exercising the prepayment option should interest rates fall.

Figure 7 shows historical prepayment levels by payment date. The largest prepayment surge took place in connection with the April payments in 2005 when callable bonds worth EUR 17bn were prepaid. The prepayment surges gave rise to hectic activity in the mortgage bond market as borrowers had to issue new bonds with lower coupons when prepaying. The subsequent rising interest rate levels reduced prepayments in 2007 and 2008 to around EUR 1bn-2bn quarterly, and when interest rate levels decreased again in 2009, 7% bonds of a total EUR 12bn were prepaid on the July and October payment dates.

Figure 7: Prepayments on quarterly payment dates



Total prepayments by payment date in EURbn.

Source: Nykredit

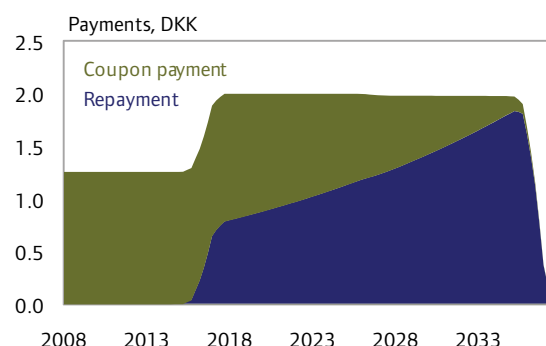
Interest-only option

In 2003 Danish mortgage legislation was liberalised, and borrowers were given the opportunity to raise loans with IO periods of up to 10 years.

Before October 2003, borrowers were not allowed to repay loans at a slower rate than that of a 30Y annuity. The pass-through principle led to a large issuance of bonds with IO periods of up to 10 years. Bonds with this repayment profile have nearly no repayments for the first 10 years and subsequently a 20Y annuity repayment profile. Almost EUR 32bn of this type of bonds is outstanding.

The latest legislative amendments (SDO/SDRO) in 2007 allowed IO periods of more than 10 years where LTVs do not exceed 75%. This liberalisation led to the arrival of new products. Nordea and Nykredit have opened 30Y bond series with IO periods of up to 30 years.

Figure 8: Cash flow of 30Y bonds with 10Y IO periods

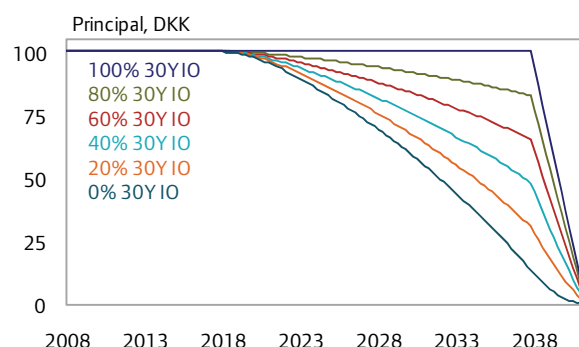


Cash flows of a 30Y callable bond with an initial IO period of 10 years.

Source: Nykredit

As borrowers with an LTV above 75% cannot obtain IO periods over 10 years, Nordea has opened one series with an IO period of up to 10 years and one series with an IO period of up to 30 years. Nykredit has opted to fund loans with IO periods of up to either 10 or 30 years in the same bond series. The cash flows from these bonds thus represent a weighted average of the payments from borrowers with the two types of loans. In Nykredit's version, borrowers may extend their IO periods after expiry of the first 10Y IO period if they meet the relevant requirements at the time of extension, and Nykredit is prepared to grant the extension.

Figure 9: Cash flows with 10Y-30Y IO periods



The cash flow of Nykredit's 2041 IO is between that of a 10Y IO and a 30Y IO. The cash flow of 80% 30Y IO above represents a weighted cash flow with 80% 30Y IO and 20% 10Y IO.

Source: Nykredit

The latest published cash flows from Nykredit based on actual lending since the opening of 6% 2041 IO are very similar to an estimated profile with an 80% 10Y IO period and a 20% 30Y IO period. However, due to the option to extend the IO period later, the bond is priced on the basis of a much more conservative repayment profile.

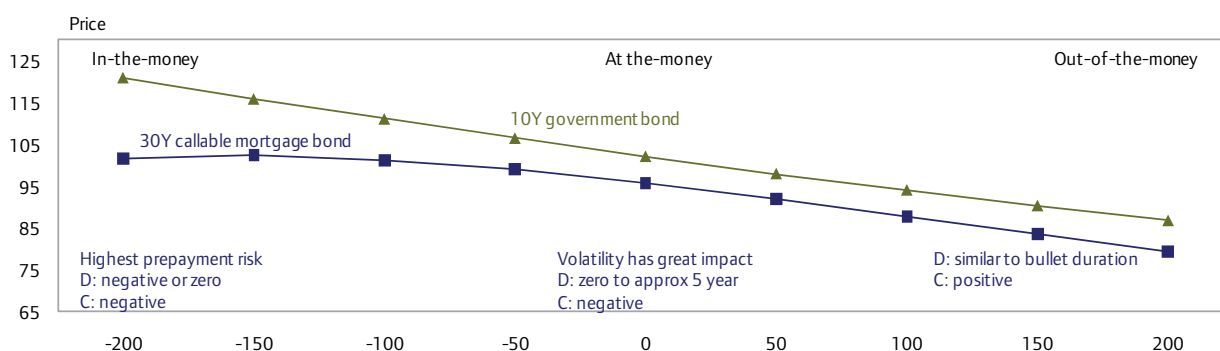
Investment in callable bonds

The prepayment option means that investors obtain only limited upside potential when interest rates fall, but nonetheless typically a significantly higher YTM relative to non-callable bonds involving the same interest rate risk.

The prepayment option makes the pricing of the bonds relatively complex and places demands on investors' risk management. Successful investment in callable mortgage bonds requires an understanding of how prepayment risk affects pricing. Figure 10 shows typical trends in market prices given changes in yields as well as the significant variation in characteristics depending on

whether prices are far below or close to 100. The prepayment option makes these bonds very different from other similar bonds without embedded prepayment options. This means that certain bond key figures commonly used such as YTM and YCS are of limited usefulness. Instead, investors should apply a theoretical pricing model to assess risk as well as the investment potential in callable bonds. The pricing model applied is presented in "Modeling Danish mortgage bonds". The key figure most commonly applied in the assessment of the investment potential of callable mortgage bonds is the option-adjusted spread (OAS). The OAS reflects the yield pick-up investors obtain when adjusting for the prepayment option.

Figure 10: Theoretical price of a 30Y mortgage bond vs the price of a 10Y government bond



Difference between the theoretical prices of a 30Y callable bond and a 10Y government bond on shifts in interest rate levels. D is duration and C is convexity.

Source: Nykredit

The OAS key figure provides investors with a basis for comparing the value of callable mortgage bonds with other investment alternatives. OAS is typically estimated relative to the Danish swap curve and implied swaption volatilities, but may also be estimated relative to the government bond yield curve. Current OAS levels play an important role, and trading strategies are often established as a result of OAS changes.

Callables – out of the money

Callable bonds trading far below par (100) (low-coupon bonds) have characteristics that resemble those of non-callable bonds because of the limited value of their prepayment option. The risk management of these bonds is therefore relatively simple. These bonds are often the first choice of new or non-Danish investors. A very common trading strategy for this group of callable mortgage bonds is to buy mortgage bonds and sell government bonds with the same risk profile. The calculation of hedge ratios will typically be based on the option-adjusted basis point value (OABPV). Such strategy also provides investors with:

- Positive carry
- Neutral or limited negative convexity
- Exposure to rising volatility

Foreign covered bond investors may establish corresponding investment strategies, eg by selling covered bonds and buying callable mortgage bonds.

Callable mortgage bonds – at-the-money

Callable mortgage bonds trading close to par will have an at-the-money prepayment option. The risk management of these bonds is complex because of their high negative convexity. The bonds are characterised by limited upside potential and significant downside risk. The downside is attributable to rising yields increasing duration significantly (extension risk). The high complexity means that investors typically demand a higher risk premium (OAS) for buying these bonds. The hedging of callable bonds trading close to par requires interest rate derivatives to hedge both extension and volatility risk or regular adjustment of hedges with non-callable bonds (delta hedging). Investors often establish strategies involving swaptions to hedge risk.

Callables – in-the-money

Callable bonds trading far above par (high-coupon bonds) have typically been subject to high prepayment rates on a number of past payment dates. As a result, the current outstanding amount

only constitutes a small fraction of the original outstanding amount (pool factor below 10%). At present, bonds issued with a coupon of 6% or higher fall into this category. On account of the low pool factor, prepayments have become less dependent on interest rate levels as most rational borrowers have already pre-paid their loans. Furthermore, it will take significant yield rises before extension risk becomes a problem. This type of bond has a duration close to zero and is traded as an alternative to the money market. Because of the small outstanding amount, liquidity is low and large positions/sales are difficult to execute.

Investors who prefer investments in high-coupon mortgage bonds to money market investments are therefore willing to assume the interest rate and prepayment risks which do not exist in the money market. These investors are also willing to risk a prepayment rate higher than discounted by the market as well as a volatility increase.

Borrower prepayment behaviour

There may be several reasons for prepaying a mortgage loan. In order for the investor to assess the risk inherent in callable bonds, an understanding of the underlying motivation is useful. In Denmark, the predominant motive is to obtain a positive prepayment gain in the form of a reduced NPV of the debt and consequently a reduction in after-tax payments. This can be done by prepaying high-coupon loans and switching to loans carrying lower rates which are either fixed, adjustable or floating.

Prepayments have a direct effect on bondholders' positions, while all other refinancing methods only have an indirect effect. Below we will only use the term "prepayment" for early repayment at par when the bond is trading above par. Prepayments will be registered as drawings, whereas refinancing through the purchase of bonds at market prices (the delivery option) will only result in a market demand for the bonds. Such market demand may have an indirect effect on the prices of the bonds concerned.

As a consequence of the callability of callable fixed-rate and callable floating-rate loans, borrowers may prepay their loans by repaying the bond debt outstanding at par¹. The required notice of prepayment is two months before the next payment date (five months for some older mortgage bonds). For investors, this implies a prepayment risk throughout the maturity of the bond.

The introduction of ARMs in 1996 based on short-term rates, the very low interest rates in recent years and the introduction of floating-rate mortgage loans with embedded 30Y interest rate caps at end-2004 have led to historically high prepayments. Also, the deregulation of the financial system and increased competi-

tion between mortgage banks have underpinned this development.

When trying to determine the correlation between prepayment rates and economic variables such as interest rate levels, it is important to note that legislation has in many cases had a major impact on prepayment activity.

Costs related to prepayment

Apart from the prospects of lower rates, prepayment costs also play a role.

Prepayment costs relate to both the existing and the new loan. When the new bonds are sold, a commission must be paid to cover the trading costs on NASDAQ OMX Copenhagen as well as other transaction costs. In addition, a small loan fee is payable. In connection with the registration of a mortgage, registration charges will also be payable to the public authorities.

The table below shows an example of the costs incurred by a typical homeowner when prepaying a Nykredit mortgage loan of DKK 1m. The costs of prepaying a mortgage are generally the same across mortgage banks.

Table 7: Typical costs of prepaying a loan of DKK 1m

Cost elements	Amount, DKK
Loan fee	4,000
Registration fee	1,400
Registration handling costs	4,000
Office copy of Danish Land Registry entries	175
Commission (0.15%)	1,500
Prepayment fee	950
Price spread (0.10)	1,000
Interest difference*	9,500-24,000
Total cost	22,525-37,025

*Interest difference depends on the time of prepayment. The shortest period subject to residual interest payment is two months prior to the next payment date (notice of prepayment). The longest period for residual interest payment is five months.

Source: Nykredit, September 2009

Refinancing determinants

Several factors influence the refinancing gains of individual borrowers. It used to make a difference whether the borrower was a private individual or a company as there were different rules governing the amounts of interest deductible for tax purposes. However, amendments to tax laws have harmonised these rules in practice.

Due to the fixed costs related to loan prepayment, the size of the debt outstanding and the remaining term of the loan are decisive

¹ Note that callable floating-rate loans will often be callable at a price of 105 and not at par.

to borrowers' potential refinancing gains. In bond series with a relatively high number of large loans, current drawings will, other things being equal, exceed those of equivalent series with small loans.

Lastly, it also plays a role whether the loan is a bond or a cash loan as the after-tax payments on cash loans are lower than on corresponding bond loans. The lower repayments are a result of the fact that the capital loss arising on disbursement of the loan (as a result of the underlying bonds being issued below par) is factored into the loan rate and the borrower obtains a deduction for tax purposes on the current interest payments.

This advantage lapses in case of the prepayment of a cash loan, and the potential prepayment gain of a cash loan is therefore smaller than that of a bond loan. In addition, private borrowers with cash loans are subject to tax on any capital gains. Furthermore, the taxation of capital gains is the reason why only a limited share of private borrowers has fixed-rate callable cash loans today.

Bond versus cash loans:

Bond loan:

The principal of a bond loan equals the nominal value of the bonds issued to fund the loan, and the interest payments will correspond to the coupon payments on the bond.

Cash loan:

The principal of a cash loan equals the market value of the bonds issued, and interest payments will correspond to the yield-to-maturity of the bonds adjusted for compound interest.

Refinancing not constituting prepayment

After a period of rising interest rate levels, borrowers have been seen to refinance from callable fixed-rate loans based on low-coupon bonds to callable fixed-rate loans based on bonds with higher coupons. This provides borrowers with an opportunity to prepay if interest rates decrease again. Refinancing and extension are situations where borrowers wish to change the characteristics of their loans. They may for example want to extend the term of their loan from 20 to 30 years or extend the interest reset period of adjustable-rate loans, etc.

Although it is possible for homebuyers in Denmark to assume existing mortgage debt, the sale of a property will usually result in loan refinancing (or prepayment if bond prices are above par).

FLOATING-RATE BONDS

Danish mortgage banks have a total outstanding amount of floaters and capped floaters of EUR 63bn, of which EUR 54bn is DKK-denominated and EUR 9bn is EUR-denominated.

In 2000 borrowers were offered the opportunity to raise 30Y floating-rate mortgage loans with interest rate caps. The bonds behind these loans are capped floaters with maturities of up to five years. After five years, the loans are refinanced into new 5Y capped floaters, and the interest rate cap is thus only effective for five years. In 2004 it became possible to raise loans funded by capped floaters with maturities of up to 30 years, enabling borrowers to obtain a fixed interest rate cap covering the entire loan term. Since then, the development and introduction of new floating-rate loan and bond types have continued. As a result, a large number of floating-rate bonds with different features are now being offered. Floating-rate mortgage bonds with embedded caps are denoted capped floaters (CF).

A basic standard for the issuance of floaters and capped floaters has emerged in the Danish mortgage market. Common to the bonds is that they are based on 3M or 6M Cibor/Euribor rates. The bonds pay coupon in accordance with the Danish bond standards (actual/actual), see below.

Table 8: Standard features of Danish floaters

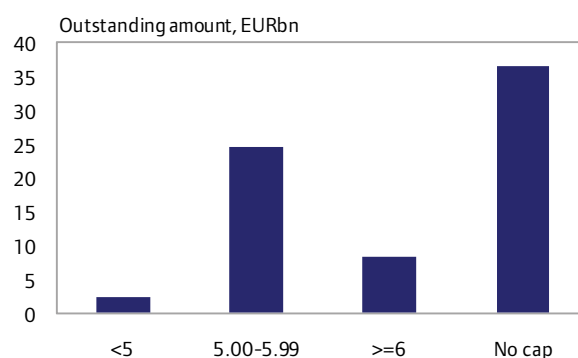
Payment dates pa	2 or 4
Number of coupon fixings	2 or 4
Reference rate	3M or 6M Cibor/Euribor
Fixing period	From 3 to 8 banking days before a payment date (varies)
Coupon fixing formula	(Fixing rate + coupon spread)*multiplication factor
Multiplication factor	365/360 or 1
Maturity	Up to 30 years
Amortisation	Like the underlying loans
Cap	Caps apply to the estimated coupon, ie the maximum coupon including spread and multiplication factor

As the day count convention in the Danish bond market is actual/actual, and the reference rates (Cibor/Euribor) are money market rates, the coupons of many bonds are fixed on the basis of a multiplication factor of 365/360.

Source: Nykredit

50% of the floater market has an embedded cap. Most capped floaters are capped at 5% or 6%. Both floaters and capped floaters have been issued with maturities of up to 30 years.

Figure 11: Floating-rate mortgage bonds by coupon cap



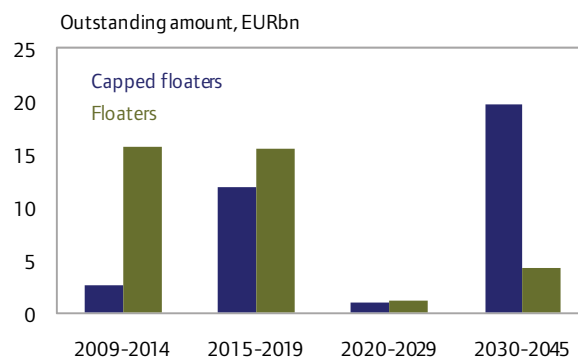
The coupon cap is the maximum coupon including coupon spread and multiplication factor (365/360). September 2009.

Source: Nykredit

Floaters without caps, which are mainly used to fund pass-through commercial lending, were originally issued with 5Y maturities. However, following the transition to the new legislation in 2007, a fairly large amount of floaters with longer maturities (10 years and 30 years) was issued.

The capped floater segment is dominated by Nykredit and Totalkredit's 10Y bonds and the 30Y bonds from all issuers.

Figure 12: Floating-rate mortgage bonds by maturity



The outstanding amount of floating-rate mortgage bonds is concentrated in the 10Y and 30Y segments. September 2009.

Source: Nykredit

In the floating-rate segment, the largest single bond series are Nykredit's 10Y floater, NYK EU 2018s, and the 10Y and 30Y capped floaters issued by the largest mortgage banks. There are more than 25 floater series (capped or uncapped) in total, each with an outstanding amount of over EUR 1bn.

Table 9: The ten largest bonds of the floater series

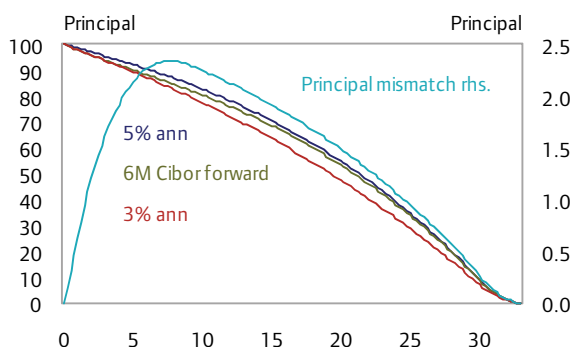
ISIN	Name	Outstanding amount
DK0009765711	1.2116% NYKEU 2018	4.3
DK0009273682	CF 5% RD 2038 IO	2.5
DK0004717980	CF 5% TOT 2016 IO	2.2
DK0009766446	2.2846% NYK 2038 IO	2.0
DK0004717121	CF 5.6778% TOT 2015	1.8
DK0009274656	2.43% RD 2010	1.8
DK0009761488	CF 5% NYK 2038	1.8
DK0009764664	CF 5% NYK 2017 IO	1.7
DK0009764318	2.4417% NYK 2011	1.7
DK0009766016	CF 5% NYK 2018 IO	1.6

The largest floater series are fairly evenly distributed between capped and uncapped floaters both in terms of numbers and volume. September 2009.

Source: Nykredit

Investment in capped floaters

Despite the variable nature of long-term Danish capped floaters, they cannot be compared with other ordinary floaters as their embedded caps involve both interest rate and volatility risk. 30Y capped floaters with 5% caps have a higher sensitivity to changes in 30Y yields than 30Y fixed-rate callable bonds. The Danish long-term capped floaters typically have an annuity cash flow (and some have IO periods). On each coupon fixing date, the annuity profile to maturity is recalculated, and this means that the bond's repayment profile becomes dependent on 6M Cibur, thereby gaining a stochastic element.

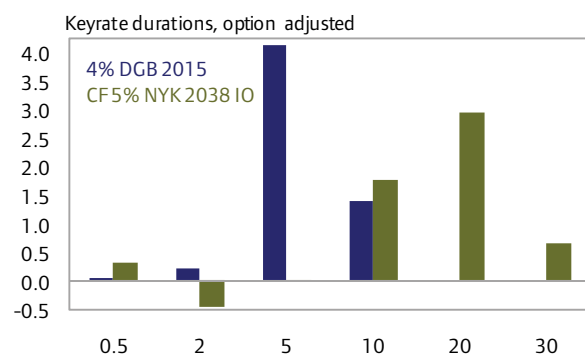
Figure 13: Cash flow of 30Y capped floater

The repayment profile is dependent on the development in 6M Cibur.

Source: Nykredit

As a result of the special characteristics of capped floaters, ordinary mortgage/government bond strategies according to which investors buy a capped floater and sell a government bond are problematic. In terms of BPV alone, it would offhand be most

natural to hedge the CF bond by selling a 5Y government bond with approximately the same duration. The problem with this strategy is that the capped floater has little or maybe even negative interest rate sensitivity at the 2Y and 5Y points, thereby making investors very vulnerable to curve steepening. A more risk-neutral strategy would be to buy a short-term government bond along with the capped floater, while selling a 20Y government bond (or entering into a 30Y payer swap).

Figure 14: Key rates, capped floater vs. government bond

CF 5% NYK 2038 has negative duration at the 2Y and 5Y points which implies significantly different key rate durations than those of a government bond with approximately the same duration.

Source: Nykredit

Capped floaters are a natural asset class for asset swap investors who can buy the bonds along with an amortising cap. For more details, see "Derivatives strategies".

Investment in Danish covered bond floaters

Uncapped floaters are near-perfect plain vanilla floaters. However, a number of features make their pricing differ from that of a plain vanilla product. Firstly, a large part of the bonds have two annual coupon fixings and four annual payment dates. This implies an interest compounding effect which means that the price on coupon fixing will be just over par (100) – other things being equal. The approximation by which you multiply 365/360 with the coupon to compensate for the difference between the money market and the bond day count convention is generally fairly effective, but will in some quarters produce deviations from the actual holding period return in the money market. Finally, it further increases the complexity that some of the floating-rate bonds are callable at par.

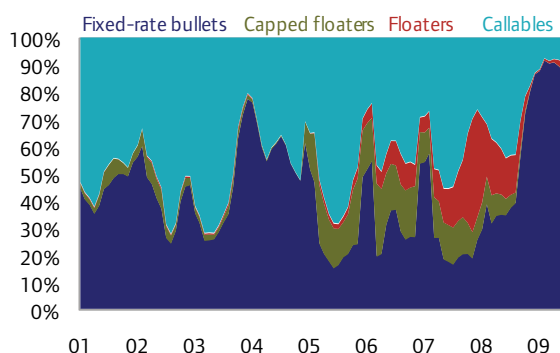
Although Danish covered bond floaters are nearly plain vanilla, investors should nonetheless take into consideration the special circumstances in relation to coupon fixing, coupon payments and callability.

FIXED-RATE BULLET BONDS

In the Danish mortgage bond market, uncapped ARMs to households are funded through a current issuance of short-term bullets. The funding of floating-rate loans to commercial customers is based on either floaters or short-term bullets. Loans with interest periods of between one and five years are funded by bullet bonds with corresponding times-to-maturity. The loans behind may have times-to-maturity of up to 30 years and initial interest-only periods of up to 10 or 30 years. Danish non-callables may be regarded as a unified market where eg all 4% MTG Jan 2011s have exactly the same features irrespective of issuer.

Following the introduction of ARMs in 1996 and up to 2004, many borrowers opted to take advantage of the steep yield curve by raising ARMs funded by short-term fixed-rate bullets. From 2005 to H1/2007, callables and capped floaters dominated issues as the curve flattened and the added cost of an interest rate hedge was reduced. Since H2/2007, borrowers have had renewed appetite for floating-rate loans at the expense of callables and capped floaters due to a steepening of the yield curve.

Figure 15: Covered bond issues by segment



During 2009 the demand for ARMs has increased again and prompted a substantial rise in the share of overall issuance of fixed-rate bullets.

Source: Nykredit

Daily lending activities are funded through tap issuance of non-callables. By far the majority of non-callables have maturities of 1 year.

Non-callables auctions

Traditionally, Danish mortgage banks have conducted bullet auctions in December. Concurrently with the significant increase in the outstanding amount of fixed-rate bullets, some issuers have voiced a need to spread the refinancing auctions over the year in order to reduce auction volumes and thereby spark investor appetite. Consequently, Nykredit decided to base all new ARMs lending on series maturing in April and October while only the refinancing of existing loans will be auctioned in December. RD has announced that their 2009 refinancing of bonds maturing

on 1 January 2009 will be divided into two auction rounds, one in November and the other in December. For now, the rest of the mortgage banks maintain their one auction round in December.

The 1Y segment is by far the largest, followed by the 3Y segment. Historically, 1Y bonds account for over 80% of the total auction volume, and the 3Y segment typically accounts for about 10% of the total auction volumes.

Table 10: DKK-denominated fixed-rate bullets on auction

	EURbn	1Y	2Y	3Y	5Y
2008	46	95.8%	0.9%	2.1%	1.1%
2007	38	86.5%	1.4%	9.4%	2.4%
2006	40	85.2%	1.4%	9.5%	3.6%
2005	42	82.2%	5.5%	10.3%	2.0%
2004	33	86.0%	5.6%	8.2%	0.2%
2003	17	84.1%	9.0%	5.8%	1.1%

By far the majority of the amounts auctioned is in 1Y bonds. September 2009.

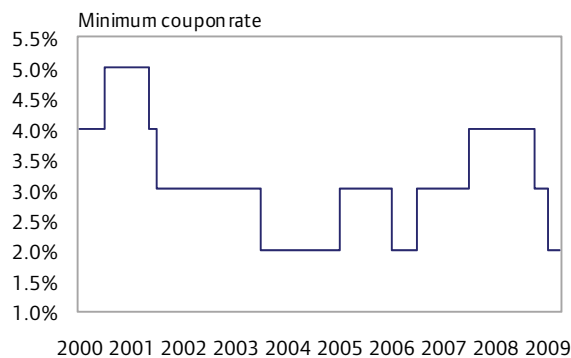
Source: Nykredit

Fixed-rate bullets with maturities of up to 10 years are available, but the market is dominated by short-term 1Y bonds.

Tax concessions to private investors in low coupons

Some non-callables with low coupons are extremely expensive due to the Danish tax rules. Private investors in Denmark are only liable to pay tax on the coupon payments of so-called blue-stamped bonds – not on capital gains. To obtain blue-stamping, the bonds in question must have been issued in periods when the official minimum coupon rate is below the bond coupon rate. All non-callables are blue-stamped, and new bonds are consequently opened when the minimum coupon rate changes.

Such a tax effect is currently most significant in relation to non-callables with a coupon rate of 2%. 2% bonds were issued in the period from 1 January 2005 to 1 July 2006 and again from April 2009. In the intermediate period, only BRF decided to issue 3% bonds, while the other issuers resumed issuance in their existing portfolios of 4% bonds.

Figure 16: Minimum coupon rate

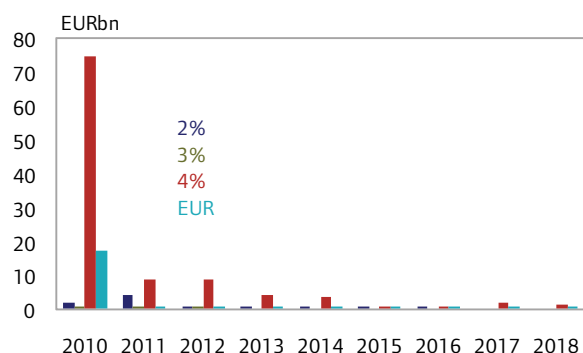
2% bonds were issued in the period from 1 January 2005 to 1 July 2006 and again from April 2009.

Source: Nykredit

EUR-denominated non-callables

Danish mortgage banks also offer EUR-denominated non-callable bonds to fund their EUR-denominated lending. These have lower outstanding amounts than the DKK-denominated equivalents. Almost all EUR-denominated non-callables have been issued as 1Y bonds. EUR-denominated bonds have the same features and rating, etc as DKK bonds.

To meet the ECB repo requirements, the Danish securities depository (VP Securities A/S) set up a subsidiary (VP Lux) in 2008 in Luxembourg through which Danish mortgage banks may issue EUR-denominated bonds. Bonds issued by VP Lux from June 2009 are repo-eligible with the ECB. So far, more than 30 series have been opened through VP Lux, and at end-July 2009, the outstanding amount issued through VP Lux reached EUR 16.3bn.

Figure 17: Fixed-rate bullets typically have short maturities

Market volume in fixed-rate bullets is concentrated in bonds with short maturities. EUR 18bn-worth of fixed-rate bullets are EUR-denominated. September 2009.

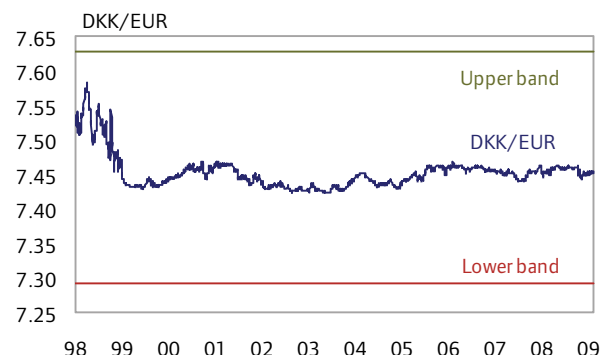
Source: Nykredit

In line with DKK-denominated bonds, EUR-denominated bonds are also repo-eligible with Danmarks Nationalbank.

Investment in fixed-rate bullets

In contrast to that of callable mortgage bonds, the pricing of non-callable mortgage bonds is very straightforward. The bonds from most issuers are Aaa rated and typically priced quite aggressively against the swap curve. The 1Y segment usually trades at a negative spread against the Danish swap curve.

The very low complexity makes these bonds attractive to a number of investor segments that wish to avoid or are unable to manage the risk related to callable bonds. Foreign investors familiar with investments in the euro covered bond market could just as well buy Danish fixed-rate non-callable bonds. The increasing amount of EUR-denominated fixed-rate bullets issued through VP Lux allows for direct comparison with other euro covered bonds. The only risk factor in relation to DKK-denominated bonds compared with the euro covered bond market is the foreign exchange exposure to DKK. The foreign exchange risk is, however, very limited as the DKK is pegged to the euro around a central parity of 7.46.

Figure 18: Limited foreign exchange risk

The DKK is pegged to the euro around a central parity of 7.46 as a result of Denmark's fixed exchange rate policy vis-a-vis the euro area.

Source: Nykredit

During the year, short-term non-callables are often traded as carry papers relative to the DKK government curve. The amounts auctioned are so large, however, that marginal investors fund their purchases through repos, etc. At the auctions, many investors buy non-callables relative to the Eonia swap curve.

The Danish covered bond framework

- Issuers of SDRs/SDOs must continuously ensure that the cover assets behind the issued bonds remain intact
- Covered bond issuers must for each capital centre/cover register choose between two different balance principles. The choice of balance principle must appear from the bond prospectus
- Covered bonds are regulated by slightly different rules, and covered bonds issued by mortgage banks generally benefit from a higher level of security than covered bonds issued by commercial banks

The Danish covered bond framework

Danish mortgage legislation dates back to 1851, and together with Germany, Denmark has the oldest mortgage legislation in the world.

In Denmark covered bond issuance is regulated by the Danish Mortgage-Credit Loans and Mortgage-Credit Bonds etc. Act (mortgage banks) and the Danish Financial Business Act (commercial banks) and a number of Executive Orders on eg ALM and property valuations. Danish legislation was last extensively amended in the summer of 2007, in part to ensure the continued eligibility of Danish mortgage bonds as covered bonds under the stricter CRD definition. In this connection, the Danish balance principle (ALM requirements) was adapted to European standards, and commercial banks gained access to issuing covered bonds. The Danish Financial Supervisory Authority (FSA) supervises compliance with current legislation and regularly conducts on-site inspections.

The Danish covered bond framework rests on the following:

- Bonds are primarily issued against mortgages on real property within specified LTV limits, cf Table 11 and Table 12.
- Continuous compliance with LTV limits. If property prices fall to an extent where LTV limits are exceeded, issuers must provide additional collateral to the cover pool.
- Specific requirements for regular valuations of the properties included in the cover pool.
- Specific requirements for overcollateralisation (OC). Mandatory OC only applicable to mortgage banks.
- The balance principle, which ensures that issuers can assume only limited market risk in the form of interest rate risk, foreign exchange risk, option risk and liquidity risk.
- In case of the insolvency of an issuer, legislation provides for protection of the bondholders of a capital centre or a cover register (ie the assets are bankruptcy remote). In principle, investors are therefore unaffected by the insolvency of an issuer provided that the cover pool contains sufficient assets.
- The Danish FSA supervises bond issuers' compliance with the regulatory framework.

Danish covered bonds are issued as either ROs, SDOs or SDRs. RO denotes mortgage bonds issued under the former Danish mortgage bond legislation, while SDRs and SDOs are issued under the Danish covered bond legislation which took effect on 1 July 2007. The main difference between SDOs/SDRs and ROs is that ROs are not CRD compliant if issued after 1 January 2008. Table 12 overleaf outlines the main differences between the three types of covered bonds.

SECURITY

Eligible assets

Mortgage banks and commercial banks are licensed to carry on mortgage banking, ie, to grant loans against registered mortgages on real property, unsecured loans to public authorities, loans guaranteed by public authorities or other non-subordinate claims against and guarantees issued by credit institutions based on the issue of Danish covered bonds.

Assets eligible as security for Danish covered bonds vary depending on the type of covered bonds issued, cf Table 12.

Cover registers and capital centres

Banks must keep assets serving as security for covered bonds separate from other assets in a so-called cover register (cover pool).

Mortgage banks are specialised banks whose business area is limited to the granting of mortgage loans funded by covered bonds. Usually mortgage banks segregate the assets, placing assets serving as security for various covered bond issues in separate capital centres (cover pools). Assets serving as security for SDRs or SDOs must be segregated into independent capital centres.

If a mortgage bank has assets that are not placed in capital centres, the assets are said to be held by the "institution in general". Assets serving as security for ROs may be segregated into independent capital centres or held by the "institution in general".

Liability

Borrowers are liable for loans granted against mortgages on real property both personally and to the extent of the mortgaged property. Covered bond issuers may waive the requirement for personal liability

LTV limits and continuous LTV compliance

Danish covered bond issuers are subject to LTV limits which are very similar to the CRD limits. Note that the LTV limits must be complied with at individual loan levels. Issuers must adopt a "haircut" approach and may only include the part of each loan

which is at any time below the LTV limit when determining the value of the cover assets behind the bonds.

Table 11: LTV limits

	LTV subject to re-payment restrictions*	LTVs without re-payment restrictions
Owner-occupied dwellings	80%	75%
Trade and industry	60% (70% against extra collateral)	
Agriculture	60% (70% against extra collateral)	

* A maximum maturity of 30 years and a maximum interest-only period of 10 years.

Source: Nykredit

Issuers of SDROs/SDOs must continuously ensure that the cover assets behind the issued bonds remain intact. This means that if house prices fall, covered bond issuers must contribute additional

collateral to the capital centre or cover register, for instance in the form of government bonds.

In determining the value of the cover pool, issuers must apply the market values of the properties provided as security in each capital centre or cover register. Furthermore, the current LTV limits must be observed at individual loan level.

On issuance of ROs, issuers are not subject to a requirement of continuous LTV compliance, and for certain commercial properties the valuation principle need not be the market value principle.

Table 12: Danish covered bonds

	SDOs	SDROs	ROs
Issuers	Mortgage banks and commercial banks	Mortgage banks	Mortgage banks
CRD compliant	Yes	Yes	No
Risk weighting under the standardised approach	10%	10%	10% for bonds closed before January 2008 20% for bonds closed after January 2008 (not CRD-compliant covered bonds)
Cover pool assets	- Mortgage on real property - Ship's mortgages (only commercial bank issuers and in separate cover register) - Loans to public authorities - Claims on credit institutions (max 15% of total outstanding nominal amount of bonds) - The Danish FSA may allow other CRD-compliant assets	- Mortgage on real property - Loans to public authorities	- Mortgage on real property - Loans to public authorities
Derivatives pari passu with bonds	Yes	Yes	Yes (for derivatives contracts entered after July 2007)
Continuous LTV compliance	Yes	Yes	No
Unrestricted IO period and loan term	Yes – up to 75% LTV	Yes – up to 75% LTV	No
Issuance of junior covered bonds	Yes	Yes	No
Balance principle (ALM requirements)	"Specific" or "general" at individual capital centre/cover register level	"Specific" or "general" at individual capital centre/cover register level	"Specific" or "general" at individual capital centre/cover register level
Market value principle	This principle only	This principle only	Other principles also allowed

Main differences between the three types of Danish covered bonds.

Source: Nykredit

Valuation principles

The Danish FSA has issued an executive order containing rules on the valuation of properties provided as security for covered bonds. The key principles are:

- The value of a mortgage must not exceed the open market value of a property which may reasonably be achieved within a selling period of six months (open market value), regardless of whether the property has just been traded at a higher price.
- Inspection and valuation may only be carried out by professional valuers who possess the experience relevant to the property type and market in question, and who are independent of the credit granting process of the mortgage bank.
- Owner-occupied dwellings must be valued at least every three years to ensure LTV compliance.
- Commercial properties must be valued annually.
- Approved statistical models may be used for this purpose.

Issuers must also apply market value principles in determining obligations to bondholders. The value of the cover assets must at any time exceed the value of the obligations to bondholders.

Overcollateralisation

For mortgage banks, mandatory overcollateralisation (OC) must correspond to the capital adequacy requirement of 8% of risk-weighted assets (RWA). This requirement applies for each capital centre. For commercial banks, there is no such requirement. Both mortgage banks and commercial banks may supply voluntary OC to achieve higher ratings.

In mortgage banks, mandatory OC depends on the risk weighting of mortgage loans. Under Basel I, the risk weighting of residential mortgage loans was 50% and 100% for commercial mortgage loans, which meant that a mortgage bank like Nykredit de facto had to uphold mandatory OC of 5%, corresponding to an average risk weighting of 60%. Under the Basel II rules, the risk weights will be lower, which will reduce the significance of mandatory OC, and particularly so for mortgage banks using the advanced computation methods under Basel II such as IRB. Mortgage banks using the standardised approach will not experience any major relaxation of the mandatory OC requirement.

RISK MANAGEMENT

The balance principle

The balance principle specifies to which extent mortgage banks and commercial banks may assume interest rate, foreign exchange, option and liquidity risk in relation to mortgage lending. Covered bond issuers must for each capital centre/cover register choose between two different systems (balance principles) for determining financial risk. The choice of balance principle must appear from the bond prospectus. This prevents issuers from

changing balance principles at their own discretion. The two balance principles are:

- The general balance principle (European-style ALM requirements)
- The specific balance principle (structural pass-through principle)

The general balance principle

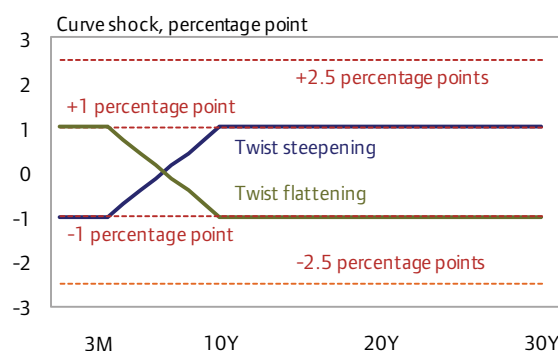
The risk limits allowed are different for mortgage banks and commercial banks. As the cover register in a commercial bank assumes market risk, the balance principle will require that capital (OC) must be contributed in cover register to cover such risk. For mortgage banks, the risk limits are determined relative to the capital adequacy requirement for each capital centre (mandatory OC) plus additional capital in each capital centre (voluntary OC). Mortgage bank risk limits are generally tighter than those applying to commercial banks.

Interest rate risk

Stress tests are used to measure interest rate risk based on six different yield curve shifts, cf Figure 19. First, the interest rate risk on parallel shifts of the curve of +/- 1 percentage point is determined. The interest rate risk must not exceed:

- Mortgage banks: 1% of the capital adequacy requirement (mandatory OC) plus 2% of additional (voluntary) OC in the capital centre.
- Commercial banks: 10% of the OC in the cover register.

Figure 19: Stress-testing the yield curve



Stress tests applied to the yield curve under the general balance principle.

Source: Nykredit

Interest rate risk is subsequently calculated at more extreme yield curve shifts of +/- 2.5 percentage points and yield curve twists, cf Figure 19, in four different scenarios.

Here, the interest rate risk must not exceed

- Mortgage banks: 5% of the capital adequacy requirement (mandatory OC) plus 10% of additional (voluntary) OC in the capital centre.
- Commercial banks: 100% of the OC in the cover register.

In both cases, the interest rate risk is determined as the largest loss of net present value at the curve shifts tested. The determination is made for each currency, and the total interest rate risk is determined as the sum of the interest rate risk of each currency. Netting of interest rate risk between different currencies is basically not allowed. Exceptions are, however, positions in DKK and EUR where netting of interest rate risk is allowed by 50% (reflecting Denmark's fixed exchange rate policy of more than 25 years).

It should be noted that the balance principle imposes significantly stricter demands on mortgage banks compared with commercial banks as far as the capital requirement is concerned if interest rate risk is assumed. Assuming that an interest rate exposure of DKK 500,000 is the result of a loan of DKK 100m, mortgage banks must allocate total overcollateralisation of DKK 27m, while banks are only required to allocate DKK 5m (Table 13). In practice, this means that there will be only very few opportunities for mortgage banks to assume interest rate risk within the capital centres even under the general balance principle. It can also be concluded that mortgage banks will have difficulties hedging DKK interest rate risk with EUR interest rate risk without triggering very strict capital requirements.

Table 13: Interest rate risk and additional overcollateralisation

	Mortgage bank	Commercial bank
Loan size	100,000,000	100,000,000
Interest rate risk	500,000	500,000
Mandatory OC*	4,000,000	0
Additional OC	23,000,000	5,000,000

*Based on a risk weighting of 50% (8% of 50% of 100m).

For mortgage banks, interest rate risk may constitute 1% of the mandatory overcollateralisation plus 2% of additional overcollateralisation and for commercial banks 10% of overcollateralisation.

Source: Nykredit

Foreign exchange risk

As in the case of interest rate risk, a stress test is used. Foreign exchange risk is the larger loss of net present value given either:

1. A 10% increase in exchange rates of currencies belonging to the EU, the EEA or Switzerland. A 50% rise in other currencies, or
2. A 10% drop in exchange rates of currencies belonging to the EU, the EEA or Switzerland. A 50% drop in other currencies.

For mortgage banks, foreign exchange risk in EUR must not exceed 10% of the capital adequacy requirement (mandatory OC) plus 10% of additional (voluntary) OC in the capital centre. For other currencies, the limits are 1% of the capital adequacy requirement (mandatory OC) plus 1% of additional (voluntary) OC in the capital centre. For commercial banks, foreign exchange risk must not exceed 10% of the OC in the cover register.

Volatility risk

Volatility risk is calculated as the largest loss at a shock of all volatilities by +/-1 percentage point. For mortgage banks, volatility risk must not exceed 0.5% of the capital adequacy requirement (mandatory OC) plus 1% of additional (voluntary) OC in the capital centre. For commercial banks, volatility risk must not exceed 5% of the OC in the cover register.

As for interest rate risk, volatility risk is determined for each currency, and generally volatility risk with opposite signs must not be set off between different currencies. Exceptions are positions in DKK and EUR where netting is allowed by 50%.

Liquidity risk

Intact liquidity at all times is secured by the following requirements:

- Interest receivable in the capital centre or cover register must exceed interest payable 12 months ahead
- The net present value of all future ingoing payments must at any time exceed the net present value of outgoing payments.

The specific balance principle

The specific balance principle defines a number of structural limits, in practice meaning that issuers must comply with a structural pass-through set-up.

As with the general balance principle, interest rate risk must be determined on the basis of various stress tests and may not exceed a marginal percentage of the OC of a capital centre/cover register.

Foreign exchange risk is only allowed for a few currencies (eg EUR, USD, SEK), and losses determined on the basis of various stress tests may not exceed a marginal percentage of the OC of a capital centre/cover register. For other currencies, the collective foreign exchange risk may not exceed DKK 30m.

Furthermore, the specific balance principle contains the following structural limitations:

- Callable loans must be funded by callable bonds.
- Index-linked loans must be funded by index-linked bonds.
- The life of options used to hedge risk must not exceed four years.

In reality, the specific balance principle remains a pass-through structure, involving a close link between lending and funding. However, to a certain extent the specific balance principle allows prepayment by delivery of bonds other than the underlying bonds.

Prepayment by delivery of alternative bonds

Prepayment of loans by way of delivery of bonds (buybacks) other than the underlying bonds is allowed. However, it may not exceed 15% of the nominal value of a mortgage bank's total volume of issued bonds when applying the specific balance principle.

Issuers of covered bonds have the following options for prepayment by delivery of bonds other than the underlying bonds:

1. Prepayment of mortgage loans by delivering mortgage bonds from other series than the series funding the loan.
2. Reuse of existing issues for funding new loans. If the existing issue is RO funded, the new loans need not comply with the LTV limits on a continuous basis, as the bonds are grandfathered.
3. Prepayment of mortgage loans by delivering mortgage bonds from other mortgage banks. In the CRD and the Danish Act on covered bonds, the amount of claims against other mortgage banks is limited to 15% of the mortgage bank's total claims outstanding in nominal terms. However, this implies a capital need according to the CRD of 10%.

Special mortgage bank requirements

In addition to the balance principle limitation of market risk in relation to mortgage lending, mortgage banks are subject to further limitations in relation to the interest rate risk and foreign exchange risk of a bank's securities portfolio, as well as the capital requirement and additional overcollateral (OC) in each capital centre.

Limits are based on the stress tests described for the balance principles, however, with marginally larger risk limits relative to a mortgage bank's total capital base. For example, on a stress test of a 1 percentage point parallel shift of the yield curve, the interest rate risk must not exceed 8% of a mortgage bank's capital base.

Commercial banks issuing covered bonds are not subject to similar requirements but only to the general provisions applying to commercial banks.

Liquidity requirements

Commercial banks as well as mortgage banks are subject to provisions ensuring that they have access to funding. For commercial banks, the liquidity requirements are primarily based on their ability to accept deposits.

Danish mortgage bank's may not accept deposits, and their funding is based solely on the issuance of covered bonds. Danish mortgage banks match fund all types of lending – even lending that are refinanced during the term of the loan. When loans are refinanced, loan rates are reset to match interest rates at which new funding is issued and sold, ie Danish mortgage banks do not incur refinancing risk.

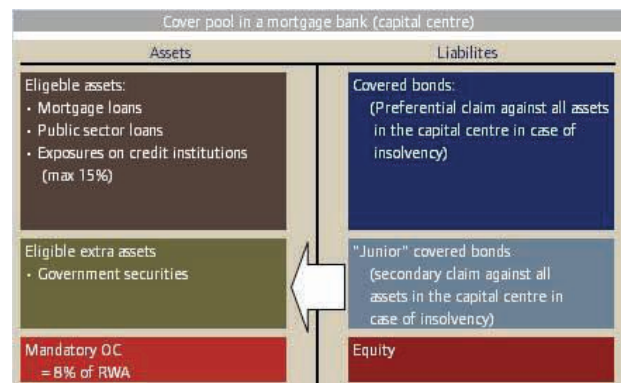
Danish mortgage banks are only exposed to liquidity shortfalls in scenarios in which borrowers default on payments of interest and redemptions. Danish mortgage banks are under no obligation to remove loans in arrears from the cover assets until a loss has been recorded. When a borrower defaults, Danish mortgage banks will have to draw on reserves and liquidity facilities only to cover late payments of interest and redemptions on bonds issued and not the bond principal. Such shortfalls are of an interim nature until recovery of the underlying assets. However, Danish mortgage banks hold sufficient reserves to withstand several years of borrower defaults in stressed scenarios.

As described, Danish mortgage banks must hold reserves exceeding the capital adequacy requirement of 8% of risk-weighted assets (RWA) in each capital centre. Further a minimum of 60% of the reserves must be invested in government debt, covered bonds or deposited in central banks, ie reserves of Danish mortgage banks are generally invested in securities which are repo-eligible with the Danish or European central bank. Further, the reserves and their composition may be larger and of better quality than required by law due to structuring.

Junior covered bonds

In addition to continuous LTV compliance, the new Danish covered bond legislation also introduced a new funding instrument, ie junior covered bonds.

Figure 20: Junior covered bonds



Holders of junior covered bonds have a secondary preferential claim on all assets of a capital centre in case of insolvency.

Source: Nykredit

Junior covered bonds may be issued to fund assets eligible as security for covered bonds in case LTV limits are exceeded. The proceeds from the issuance of junior covered bonds may only be invested in covered bond eligible assets.

Holders of junior covered bond have a secondary preferential claim on all assets of a capital centre in case of insolvency. Junior covered bonds are equally collateralised by the whole cover pool (only subordinate to regular covered bond holders and derivatives counterparties). Junior covered bonds cannot be compared with eg subprime mortgages, as the credit quality of the loans behind junior covered bonds is the same as for regular covered bonds, and junior covered bond holders have a secondary preferential claim on all assets of a cover register/capital centre. Consequently, issuers may not use junior covered bonds to grant loans exceeding the LTV limits ex ante. Junior covered bonds are issued to protect the holders of regular covered bonds in case property prices decrease.

ORDER OF PRIORITIES AND INSOLVENCY PROCEEDINGS

Creditor interest of covered bond investors

Investors in Danish covered bonds have a primary preferential claim against all cover assets in case of the insolvency of the issuer. Covered bondholders rank *pari passu* with derivatives counterparties provided the derivatives contracts are concluded for the purpose of hedging imbalances between lending and funding. Cash flows to derivatives counterparties and covered bondholders must remain unaffected by the insolvency of the issuer. Accordingly, derivatives counterparties are not entitled to demand termination of the contracts in case of insolvency of the issuer, just as payments cannot be accelerated if the issuer is declared bankrupt.

Bankruptcy remoteness – segregation, claims and procedures

Mortgage bank covered bonds and commercial bank covered bonds are regulated by slightly different rules, and covered bonds issued by mortgage banks generally benefit from a higher level of security.

As illustrated in Table 14, investors in mortgage bank covered bonds enjoy a better protection due to the mandatory OC and a better ranking of their claims in case of the insolvency of the issuer if the cover pool is inadequate.

Table 14: Security – mortgage banks vs commercial banks

Mortgage bank	Commercial bank
SDO/SDRO/RO investors' claims:	SDO investors' claims:
1. Assets in the capital centre including mandatory and voluntary OC	1. Assets in the register including voluntary OC
2. Assets in the insolvent estate of the mortgage bank BEFORE ordinary creditors	2. Assets in the insolvent estate of the commercial bank ranking <i>pari passu</i> with other creditors
Mandatory capital requirement for cover pool in case the value of the OC drops	Voluntary capital requirement for SDO cover pool in case the value of the OC drops

Differences between covered bonds issued by mortgage banks and commercial banks.

Source: Nykredit

Mortgage bank capital centres

Cover assets, mortgages and eligible securities are assigned to specific capital centres which constitute the cover pools of the covered bonds issued in accordance with Danish legislation. A capital centre consists of a group of series with joint liability and a joint series reserve fund. To become eligible as collateral, mortgages must be entered in the Danish land register or filed for registration in the register (under certain conditions). Mortgages are registered at a specific level employing a property identification code. Eligible securities are registered on an accounting basis. The registration is legally binding and will form the basis of any bankruptcy proceedings.

The issuer – which is subject to the supervision of the Danish FSA – keeps the cover register. The land register is kept by the Danish district courts.

Cover assets are assigned to cover pools on an ongoing basis in accordance with Danish legislation, and no further steps to secure a segregation of assets are therefore required.

If bankruptcy proceedings have been initiated, a trustee appointed by the bankruptcy court will administer the cover assets. As mortgage bank creditors are essentially covered bondholders, no separate administrator is appointed. Covered bond investors have a primary secured claim against all assets in the cover pool. Derivative counterparties have a corresponding primary preferential right provided that the derivatives contract stipulates that the suspension of payments or bankruptcy of the institution does not constitute an event of default. Bonds issued to secure assets as compensation for LTV excess (junior covered bonds) have a secondary preferential right to all assets of the capital centre. The trustee may re-establish the issuer, if possible, and is not necessarily required to dissolve the enterprise.

If a mortgage bank becomes subject to bankruptcy proceedings, the assets of a capital centre (including mandatory and voluntary

OC assigned each capital centre) will be segregated to satisfy covered bondholders, etc, in accordance with their legal position as secured creditors.

The same segregation of assets takes place in the "mortgage bank in general" as regards covered bonds issued outside capital centres at the level of the institution. However only the eligible securities funded by those covered bondholders and assets corresponding to the capital adequacy requirement of 8% of risk-weighted eligible securities (mandatory OC) will be segregated to satisfy those covered bondholders, etc, in accordance with their legal position as secured creditors.

Any excess funds (in the "mortgage bank in general" directly or transferred from closed capital centres) will form part of the assets available for distribution immediately or subsequently.

Any outstanding claims against the capital centres (including any claims by covered bondholders against the "mortgage bank in general") – also referred to as residual claims – are payable out of the assets available for distribution. In this case, covered bondholders and derivative counterparties are secured creditors ranking before ordinary creditors, including holders of junior covered bonds. Junior covered bond holders are thus secondary secured creditors in relation to the capital centre but ordinary creditors as regards the assets available for distribution.

The bankruptcy proceedings against a mortgage bank cannot be closed until the last creditors have been paid or all funds have been distributed. Note that no Danish mortgage bank has ever been subject to bankruptcy proceedings.

The preferential position ensures that a bankruptcy scenario will only in exceptional cases affect covered bond investors and derivative counterparties, thereby rendering bonds bankruptcy remote.

Bankruptcy regulations applicable to Danish mortgage banks contain detailed guidelines which must be observed in a bankruptcy scenario. Key points of the guidelines are:

- A trustee will be appointed by the bankruptcy court to administer all financial transactions of the issuer
- The trustee will be instructed to meet all payment obligations under bonds issued in due time despite any suspension of payments of the issuer
- All new lending activities of the issuer will be suspended;
- The trustee may issue bonds to refinance maturing bonds and raise secured loans to obtain liquidity (cf below)
- Bonds do not accelerate when the decree of bankruptcy is issued. Payments fall due according to the original payment schedule

- Payments on loans will not be accelerated, and therefore payments from borrowers will fall due according to the original payment schedule
- The trustee will not meet the claims of other creditors until all payment obligations under the covered bonds have been met in full
- Derivative counterparties enjoy the same legal position as covered bonds.

The trustee is ordered by law to meet all payment obligations under covered bonds and the derivative contracts as they fall due.

If payments from cover assets (mortgages and OC) are insufficient to meet the payment obligations, the trustee has the authority to raise additional loans. If this fails, the issuer will ultimately default on its payments. The trustee may raise loans to meet the payments for bondholders and derivative counterparties and provide security for such loans in the form of assets other than the cover pool mortgages, ie the reserve fund assets. The lender will have a first priority secured claim against the assets provided as security but not against the mortgages.

Cover assets are assets on the issuer's balance sheet, the issuer being the mortgagee of the mortgages. Cash flows from the cover assets must be used to meet the payment obligations under the bonds and the derivative contracts. Only the issuer as mortgagee, not investors, is entitled to foreclose on cover assets. Cash flows from cover assets must be used to meet firstly the payment obligations under covered bonds and the derivative contracts, secondly the obligations under junior covered bonds

Commercial bank registers

A commercial bank may now set up a register segregating assets, which exclusively serve as SDO cover assets.

As is the case with mortgage banks, derivative counterparties have a primary preferential right in line with the SDOs provided that the derivatives contract stipulates that the suspension of payments or bankruptcy of a commercial bank does not constitute an event of default. Bonds issued to secure assets as compensation for LTV excess (junior covered bonds) have a secondary preferential right to all assets of the register.

The register is kept by the commercial bank and must at all times contain all assets, guarantees received and derivatives contracts, clearly individualised. The commercial bank must submit statements of the assets to the Danish FSA. The external auditor must perform continuous regular control of the register and at least twice a year make unannounced of register audits.

Where the Danish FSA suspends the licence of a commercial bank to carry on banking business, the Danish FSA or the bank files a

bankruptcy petition, or the bank is adjudicated bankrupt following the petition of a third party, the Danish FSA will decide whether the register is to become subject to administration by an administrator as an estate in administration. The administrator (and not the ordinary trustee) will be in charge of the assets of the register.

Any unsatisfied residual claims by SDO holders and derivative counterparties against the register may be proved against the assets available for distribution of the commercial bank, but – contrary to the proceedings related to mortgage banks – exclusively as ordinary claims. Residual claims from junior covered bonds may also be proved as ordinary claims against the assets available for distribution.

The register is – contrary to the capital centres of mortgage banks – not subject to any specific statutory minimum requirement as to capital adequacy (no mandatory OC). The 8% capital adequacy requirement must only be fulfilled at the level of the commercial bank.

Mortgage banks vs commercial banks

Situations may occur where substantial capital injections are required to maintain the security behind the issued covered bonds, eg if property prices plunge. In such situations, the mortgage bank set-up will be safer for investors than the commercial bank set-up. This is because Danish mortgage banks are legally obliged to inject capital into a capital centre that is unable to fulfil the OC requirement as long as there are excess reserves available in the mortgage bank. By contrast, commercial bank issuers may decide against injecting extra capital into a cover register. A commercial bank will then have to choose between protecting the covered bond investors or the other creditors and shareholders of the bank. If it fails to inject the necessary capital into the cover register, the bank will forfeit its right to issue covered bonds. Furthermore, existing issues in the cover register concerned will lose their covered bond status. Naturally, such a scenario will only occur if the issuing bank is in severe financial difficulties.

In case of actual insolvency, any residual claim from covered bond investors in a commercial bank will rank *pari passu* with other creditors of the bank when all assets in the cover register have been distributed. In a mortgage bank, any residual claim from covered bond investors in a capital centre will have a preferential claim on the assets available for distribution (the insolvency estate). This implies a higher degree of recovery for covered bond investors in a mortgage bank.

DANISH BANK RESCUE PACKAGES

Bank rescue package I (October 2008)

A government company was established by law, ensuring payment of certain banks' senior unsecured obligations. Members of the Private Contingency Association are covered. The scheme expires on 30 September 2010 and covers eg senior unsecured issues maturing no later than the above date. The issues are rated Aaa. The scheme may cost members of the Private Contingency Association up to DKK 35bn. Mortgage banks are not included under the scheme, nor did they need to be.

Pension sector package (October 2008)

The pension sector package involves an agreement that until end-2009, mortgage bond spreads may be included in the yield curve employed by pension companies in their calculation of liabilities. Without this option, insurance and pension companies would have been forced to sell off Danish covered bonds, which in itself would have had a pro-cyclical effect.

Bank rescue package II (January 2009)

The bank rescue package consists of three parts:

- The option to apply for government hybrid core capital/government underwriting guarantee for ordinary hybrid core capital
- The option to apply for a government guarantee for junior covered bonds or senior debt maturing before 1 January 2014
- Amendments to the general provisions on hybrid core capital

Government hybrid core capital

After infusion of government hybrid core capital, the core capital must be at least 12%. If the initial core capital is 12% or more, government capital may only be added to the extent that the core capital is at most increased by 3 percentage points. Redemption may not take place for the first three years and is subject to approval by the Danish FSA. Coupon rates range between 9% and 11%. On redemption after year 5 and after year 6, redemption prices are 105 and 110, respectively. Furthermore, the credit institution assumes various obligations (eg no capital reduction, no payment of dividends until 1 October 2010).

Underwriting guarantee for ordinary hybrid core capital

If the credit institution can document significant investor interest, the government guarantees to pick up the "rest" of the hybrid core capital on market terms.

Guarantee for JCBs or senior debt expiring before 1 January 2014

Commercial banks as well as mortgage banks may apply for a government guarantee for issues of junior covered bonds or senior debt – and the application may include new as well as existing issues. Guarantee commission ranges between 77bp and 95bp. Like government hybrid core capital, a government guaran-

tee is only available on application, ie the guarantee is not a legal right.

Amendments to the general provisions on hybrid core capital

The limits for including hybrid core capital in the determination of core capital are amended to:

- a maximum of 15% of the core capital in case of an interest rate step-up clause
- a maximum of 35% of the core capital if there is no interest rate step-up clause
- a maximum of 50% of the core capital if convertible into equities.

Furthermore, credit institutions may now raise hybrid core capital with call options after 5 years subject to approval by the Danish FSA (however, only if there is no interest rate step-up clause). If an interest rate step-up clause is included, no call option must be available until after ten years at the earliest, subject to approval by the Danish FSA.

Market set up and market data

- The Danish bond market is backed by a large repo market for both government and mortgage bonds
- In order to maintain a high level of transparency in the Danish mortgage bond market, Nykredit and other Danish mortgage banks publish data for bond investors

Market participants and their roles

The Danish market for mortgage bonds has been organised as an integrated system consisting of bond-issuing mortgage banks, investors, investment banks and other members of the NASDAQ OMX Copenhagen (OMX) and VP Securities A/S (VP).

Mortgage banks arrange their own issues and sales in the primary market through the OMX and the unofficial telephone market (OTC).

All Danish mortgage bonds are listed on the OMX and registered with VP or VP LUX.

The OMX is the market place for transactions in Danish securities, while VP serves as central securities depository and clearing organisation.

The OMX and VP are electronically interconnected and also subject to supervision by the Danish Financial Supervisory Authority.

A list of OMX members is available at the OMX website: nasdaqomx.com

VP is responsible for the electronic issuance, registration including registration of ownership and rights, settlement and clearing

of all securities transactions, settlement of periodic payments (interest and principal payments) as well as custody and administration services in relation to securities. Figure 21 provides a graphic representation of the relationships between market participants.

Issuance: tap and auctions

Danish mortgage bonds are usually issued on tap as required on a day-to-day basis in combination with recurring auctions in connection with the refinancing of ARMs and floating-rate loans with a fixed-term interest rate cap.

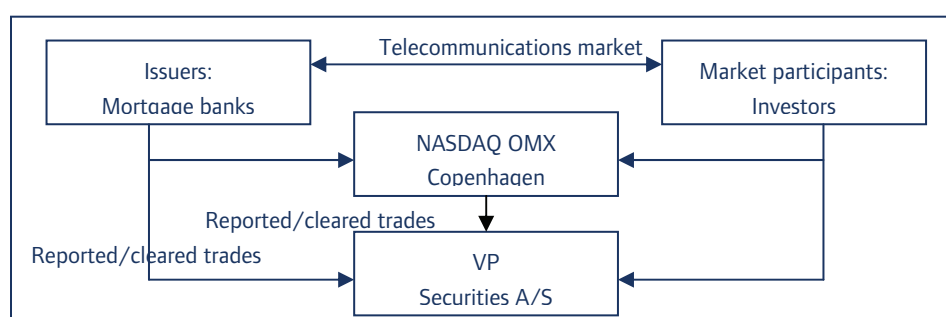
Tap issuance funds Nykredit's continuous lending activities.

At the refinancing auctions, fixed-rate bullet bonds related to the interest rate adjustment of ARMs are offered as well as capped floaters related to the adjustment of the cap on floating-rate loans with fixed-term interest rate caps.

Trading and settlement of trades

Danish mortgage bonds are traded either directly as on-exchange trading or indirectly through the telephone market (OTC) between members of the OMX. OMX members are under a duty to report all trades over a certain minimum size within three minutes from execution. However, in case of trades exceeding DKK 100m, the reporting trader may request non-disclosure until the close of the trading day. Even though all trades must be reported to the OMX, only a limited share of all trades is executed through the OMX. The remaining transactions are executed through the telephone market.

Figure 21: The Danish bond market and its participants



The Danish bond market and its participants. Mortgage bond issuers and investors.

Source: Nykredit

All trades are subsequently settled and cleared through VP. The Danish market was the first in the world to introduce electronic ownership registration of securities which is now established exclusively by VP registration.

After a transaction has been executed, VP also ensures the simultaneous delivery of the security and the payment necessary to settle the transaction (Delivery versus Payment, DvP). The DvP principle eliminates the principal risk related to the settlement of securities transactions. To enhance efficiency and liquidity in connection with settlement, VP offers settlement of cross-border securities trading through links to international securities markets. VP is linked to Euroclear and Clearstream Banking. On top of this come bilateral Free of Payment (FoP) links to the Swedish and Icelandic clearing centres. The direct links through Euroclear Bank to international securities markets enable customers of Euroclear to trade in Danish securities settled through Euroclear without the risk of losses due to late settlement.

Market making – pricing

In the Danish mortgage bond market, a number of members of the Danish Securities Dealers Association have entered into a market making agreement.

For the time being seven market makers are parties to the agreement which currently is executed according to best effort. Market makers are typically the largest Danish banks and one or more foreign stockbroker companies. Market makers are independent of bond issuers and do not receive any fees for quoting prices under the market maker agreement.

The agreements involve quote-on-request arrangements and vary in size according to liquidity levels in the bonds involved.

Nykredit Bank is a party to the market maker agreement and quotes prices for the most liquid mortgage bonds according to best effort. Furthermore, the Nykredit Realkredit Group lets Nykredit Bank quote prices in the retail market for Nykredit Realkredit and Totalkredit's liquid bonds.

The repo market

The Danish bond market is backed by a large repo market for both government and mortgage bonds. The market is a telephone market where all trades must be reported to the OMX.

The repo market comprises a large number of commercial bank and mortgage bank participants. Repo transactions account for some 75% of the overall turnover in the Danish bond market.

Central bank repo

Since the summer of 1999 Danmarks Nationalbank has accepted all Danish mortgage bonds as collateral in lending transactions with commercial banks and mortgage banks. This step has in-

creased the flexibility of the financial sector's repo financing of investors' positions in mortgage securities.

The value of the pledged collateral is determined as the official price (all trades average) on the OMX on the previous day, including accrued interest and excluding a paper-specific "haircut".

Table 15: Haircuts on borrowing with Danmarks Nationalbank

Remaining maturity	Haircut
0-1 years	1.0%
1-3 years	2.5%
3-5 years	3.5%
5-7 years	4.5%
7-10 years	5.5%
Over 10 years	7.5%

The value of the pledged collateral is determined as the official price (all trades average) on the OMX on the previous day.

Source: Danmarks Nationalbank

Danish mortgage bonds meet the requirements of highly secure bonds in the UCITS directive, Article 22(4). In line with eg German Pfandbriefe, Danish mortgage bonds would be eligible for inclusion on the ECB's Tier 1 list of collateral if Denmark should enter into the EMU.

Danish euro-denominated covered bonds issued through VP LUX are repo-eligible at the ECB and Danmarks Nationalbank.

Trading Danish mortgage bonds – significant factors and market conventions

Issuance

Danish mortgage bonds are issued on tap and, where fixed-rate bullets are concerned, by auction. The bonds are issued in book-entry form and registered with VP.

Accrued interest

Accrued interest is calculated from the last payment date (inclusive) to the settlement date (exclusive) using the Actual/Actual day count.

Bids/offers

Bid/offer spreads are typically 0.1 to 0.2 point for the most liquid bonds and higher for less liquid bonds.

Drawings

When bonds are drawn for redemption, investors and/or any rights holders will immediately thereafter receive notification, and on the due date amounts payable will be transferred to the recipients in the manner agreed. The drawing procedure is a straightforward mathematical model which determines the exact amount to be drawn in any given series. The drawing fraction is defined as:

$$\text{Drawing fraction} = (\text{amount for drawing})/(\text{outstanding amount})$$

The fraction is multiplied by the share of the relevant series in each deposit, and the amount is rounded off to DKK øre/EUR cent.

Ex-coupon

Ex-coupon periods no longer apply to Danish mortgage bonds.

Ex-drawings

Bonds are traded ex-drawings in the period between the day after the publication of drawing rates (published in the Official Stock Exchange List and uploaded under "Bond data" at nykredit.com/ir for Nykredit and Totalkredit bond series) and the payment date.

Settlement

The usual settlement period is three trading days if settlement takes place through VP. If other settlement centres are used, eg Cedel or Euroclear, the normal settlement period will be three days. However, this may vary.

Taxation

In Denmark foreign investors are not liable to taxation on investments in Danish bonds. As a general principle, resident investors pay tax on coupon payments and capital gains on Danish bonds. Private investors do not pay tax on capital gains if the relevant security meets the requirements of the Danish minimum coupon rate rules at the time of issuance.

Trade

The OMX is the central market place for trading in Danish bonds and is open daily between CET 8:30 am and CET 4:30 pm. There is, however, also a considerable unofficial market. All authorised traders on the OMX are obligated to report all trades in listed bonds even if a trade does not take place through the OMX. The authorised traders comprise stockbroker houses, Danmarks Nationalbank, banks, savings banks and mortgage banks.

Trading

Danish bonds are traded in clean prices.

Trade lot

The minimum trade lot is DKK 0.01 and EUR 0.01 for bonds denominated in DKK and EUR. OMX members are not obligated to trade through the OMX systems, but all trades exceeding a minimum amount of typically DKK 100,000/1,000,000 (depending on the liquidity in the bond) and EUR 10,000 must be reported.

Yield-To-Maturity

The YTM is determined by rediscounting the value of the cash flow to the actual amount invested – ie price including accrued interest. The cash flow is rediscounted to the settlement date when the trade is settled.

Risk weighting

In Denmark and other European countries, the risk weighting of Danish mortgage bonds classified as SDO, SDRO or grandfathered RO is 10% because of their eligibility as particularly secure securities, as defined in Article 22(4) of the EU's UCITS Directive and because they are CRD compliant.

Source: Nykredit

MARKET DATA

In order to maintain a high level of transparency in the Danish mortgage bond market, Nykredit and other Danish mortgage banks publish a range of data for bond investors, the purpose being to obtain a more effective pricing of callable mortgage bonds with focus on debtors' prepayment behaviour in callable bonds.

Data are published on:

- Debtor distribution
- Preliminary prepayments
- Notice of drawings, ie final prepayments and ordinary repayments
- Cash flows
- Basic bond data

The data are in general useful and necessary when pricing Danish mortgage bonds.

Danish mortgage banks submit the relevant data to the OMX, which redistributes them through a number of data distributors along with data on prices, daily turnover, outstanding amounts, etc.

Data on Nykredit and Totalkredit mortgage bonds (ROs) as well as covered bonds (SDOs) together with basic bond data and prevailing outstanding amounts are available for download at Nykredit's Bond Data pages at nykredit.com/ir. The data are available by ISIN in Excel format.

Figure 22 below contains a time schedule for the release of mortgage bond data.

Debtor distribution

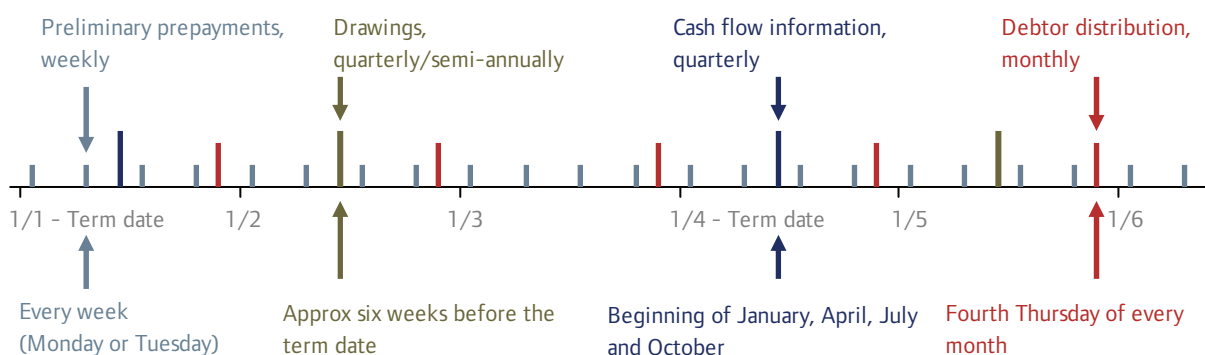
Debtor distribution data are published for all callable bond series. The data grouped in bond series cover all loans broken down into five loan groups. These loan groups represent five debt intervals as listed in Table 16. Furthermore, the distribution among these loan groups of private and non-private debtors is published. Finally, the ten loan groups are broken down into cash and bond loans which each involves different debtor tax regimes. Furthermore, the data are supplemented with the average cash loan rates of each loan group. The average cash loan rates determine the size of the post-tax proceeds from prepaying a loan and thus debtors' incentive to do so.

Debtor distribution data are published monthly and submitted to the OMX on the fourth Thursday of each month.

Preliminary prepayments

Prepayments are published for callable bonds. Prepayments for the coming payment date are compiled every Friday and the issuer is obliged to publish them at the earliest possible date hereafter, usually on the following Monday. Although the data are preliminary, they provide investors with an opportunity to monitor prepayment behaviour and make continuous assessments about the impact hereof on the individual bond series. Preliminary prepayments accelerate in the weeks before the notification date. The reason for this is the fact that the cost of prepaying a loan decreases concurrently with the expiry of the notification period.

Figure 22: Bond data - release dates



Schedule for the publication of relevant bond data.

Source: Nykredit

Table 16: Debtor distribution data supplied by mortgage banks

Name of series	Debtor distribution		Notice
Remaining bond debt (DKK 1,000)	Private ¹	Other ²	By payment date ³
<200	Rem. bond debt (bond loans)	Rem. bond debt (bond loans)	Total No of loans
	Rem. cash debt (cash loans)	Rem. cash debt (cash loans)	Total remaining debt
	Avg. cash loan rate	Avg. cash loan rate	
	No. bond loans	No. bond loans	
	No. cash loans	No. cash loans	
	Amortisation account	Amortisation account	
200-499	-same-	-same-	-same-
500-999	-same-	-same-	-same-
1,000-2,999	-same-	-same-	-same-
>3,000	-same-	-same-	-same-

¹ "Private" reflects loans for owner-occupied dwellings and recreational property.

² "Other" reflects all other types of property.

³ The data are supplied with information about the number and bond debt outstanding of loans for which notice of prepayment has been given for any future payment date regardless of whether the drawings have been published or not.

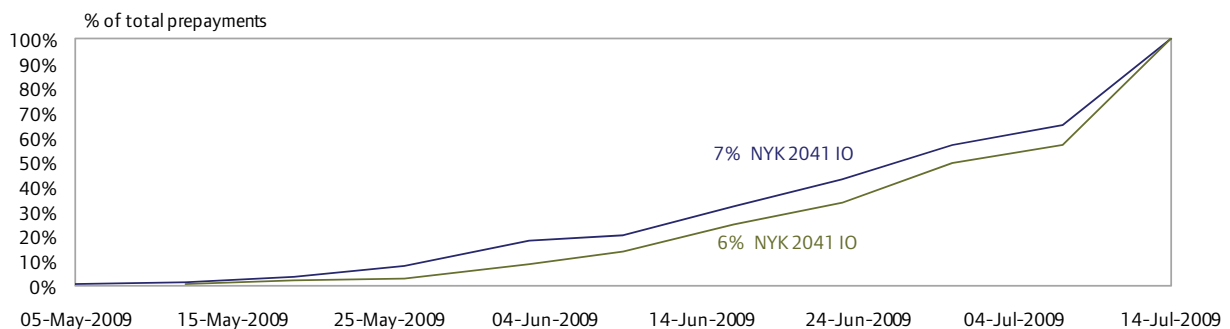
Source: Nykredit

Drawing of bonds

Total drawing rates and the distribution between ordinary and extraordinary (prepayments) drawings of a specific payment date are published approximately six weeks before the payment date. The drawing date is always a Friday known beforehand. The drawings are published on the day of drawing. On the next trading day and until the payment date, callable bonds will be traded exclusive of prepayments and ordinary repayments for the coming payment date. This means that a callable bond will be traded

as two different bonds for a while – one in which no prepayments are made on the coming payment date, and one that will be 100% prepaid. The two bonds will of course be trading at different prices.

The drawings are made on a Friday between the 18th and the 24th day of February, May, August and November. Information on the drawings of all callable bond series is published quarterly/semi-annually.

Figure 23: Preliminary prepayments

Preliminary prepayments accelerate in the weeks before the notification date. The reason for this is the fact that the cost of prepaying a loan decreases concurrently with the expiry of the notification period.

Source: Nykredit

Cash flows

Cash flows are published for all open and closed annuity series with and without interest-only options as well as serial bonds and index-linked series four times a year.

The cash flow information has been broken down into principal repayments and interest on the debtor side exclusive of administration margins. The calculations are based on all loans including loans for which notice of prepayment has been given for future payment dates, but excluding loans prepaid immediately and loans prepaid by way of delivery of bonds. The data are compiled as of 31 March, 30 June, 30 September and 30 December and submitted to the OMX within 12 trading days and published not later than at the beginning of the next trading day.

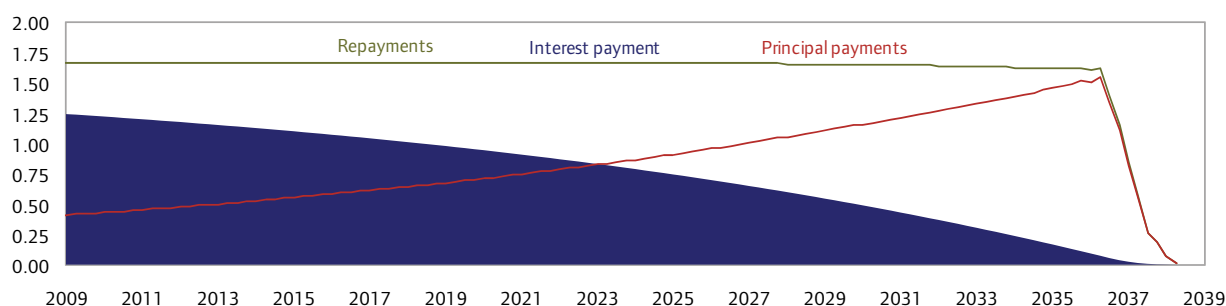
Virtually all mortgage loans are annuity loans with or without deferred amortisation, but even though the cash flow of a given Danish callable bond reflects the underlying loans, the bonds are not perfect annuities/deferred annuities. The reason for this is that all loans behind a 30Y bond are 30Y annuity loans with or without deferred amortisation. The opening period of the bonds is three years, and therefore when a bond closes for issuance and the last debtors take out loans in the bond series, the first debtors will already have had their loans for three years. In consequence, there is a three-year difference between the first and the last loans granted.

The opening period of 5% MTG 38 was 1 September 2005 to 21 December 2007. Under ordinary circumstances, the bond series was not required to close before 31 August 2008. However, following the transition to SDO legislation and to comply with the grandfathering criteria and thereby preserve a 10% weighting, the bond had to be closed before end-2007. With respect to 5% NYK 2038, this means that the bond will be an annuity bond until 2035 when the first debtors have repaid their loans in full.

As depicted in Figure 24, the repayments scheduled for the last three years decrease. This decrease will be an exact replication of the timing of debtors' entry into the mortgage pool in the opening period. As the Danish mortgage system only offers 10Y, 15Y, 20Y and 30Y fixed-rate bonds, a debtor requiring a 26Y fixed-rate callable loan or a 26Y floating-rate loan will be forced to take out the loan in 30Y bonds.

If a bond series is still open, the final cash flows will be unknown. Two different types of official cash flows are published. The first and most commonly used is the generic cash flow, which is based on the assumption that lending in the opening period is evenly distributed over the period (CK91). The other type of cash flow is estimated based only on debtors who have already taken out loans and assuming that no other debtors will be taking out loans in the bond for the rest of the opening period (CK94).

Figure 24: Cash flow of 5% MTG 2038



Repayments equal the sum of interest and principal payments.

Source: Nykredit

Other mortgage bond data

Other bond data available at nykredit.com/ir are:

- A list of all Nykredit mortgage bonds including specification of bond category, rating, capital centre and series as well as reference to the relevant bond prospectus and final bond terms
- Fact sheets on each bond type
- Bond prospectuses and other legal documents with respect to Nykredit mortgage bonds
- Rating overview of Nykredit bonds

Table 17: Overview of bond data provided by Danish mortgage banks

Info type covered	Bond series covered	Contents/calculations	Time of calculation and publication	Frequency of publication
General bond information*	All Nykredit and Totalkredit mortgage bonds	Bond ID/ISIN, short name, series, rating, coupon, type of interest rate, maturity, etc.	First trading day after the bond has been listed on the OMX.	Daily
Debtor distribution	All callable bonds excluding index-linked and pre-1970 series	Breakdown of debtors' existing loans at the time of calculation, ie including loans to be prepaid on a specific payment date but excluding immediate and bond delivery prepayments. Debtors are divided into two groups, "Private" and "Other". Furthermore, the loans are divided into five loan size groups.	Publication no later than on the fourth Thursday of every month at 12h. If the fourth Thursday is not a trading day, publication must take place on the next trading day at the latest. The calculations are made four banking days before the fourth Thursday of every month.	Monthly
Preliminary prepayments	All callable series	Prepayments (immediate and on future payment dates) by series up to the Friday before the day of publication excluding cancelled bonds.	Calculated every Friday. If the Friday concerned is not a trading day, calculation will take place on the trading day before. Weekly publication at the earliest possible date after retrieval of data, usually on Mondays.	Weekly
Drawings	All callable series	All ordinary and extraordinary (prepayments) bond drawings. Outstanding amount calculated two days before drawing.	Calculated and published on a Friday approximately six/eighteen weeks before the payment date, otherwise the trading day before.	Quarterly/semi-annually. Drawings in February, May, August and November.
Cash flows	All open and closed series except series based on adjustable-rate mortgages and bullet loans, but including floating-rate bonds.	Cash flows divided into prepayments and interest on the debtor side excluding administration margins. Based on all loans including loans terminated for repayment on future payment dates, but excluding loans prepaid immediately and loans prepaid by way of bonds.	Calculated on 31 March, 30 June, 30 September and 31 December. Submitted to the OMX, not later than 12 trading days after calculation and published not later than at the beginning of the next trading day.	Quarterly
Bond terms and conditions	All series	Terms and conditions	When new bond series are opened.	Continuously

*Additional information may be downloaded from Nykredit's website.

Source: Nykredit

- Nykredit provides two major indices that cover Danish mortgage bonds – Nykredit Danish Mortgage Bond Index and Nykredit Total Index
- Interest rate derivatives may be applied for asset swap packages based on callables as well as capped floaters
- In order to calculate theoretical (model) bond prices and key figures such as option-adjusted duration, the prepayment model is combined with a stochastic term structure model which is calibrated to the Danish yield curve (swap or government) and to implied volatilities for Danish caps and swaptions

Nykredit's mortgage bond indices

Due to the size of the Danish mortgage bond market, benchmarks are important elements. There are several Danish mortgage bond indices that enable investors to follow developments in the market. Nykredit provides the oldest index and has two major indices that cover Danish mortgage bonds – the Nykredit Danish Mortgage Bond Index and the Nykredit Total Index.

The index value of the Nykredit Danish Mortgage Bond Index is calculated based on a portfolio consisting of the most liquid mortgage bond series listed on NASDAQ OMX Copenhagen (in terms of outstanding amount). The Nykredit Danish Mortgage Bond Index is a tradable, liquid benchmark index of Danish covered bond market. It includes callables, fixed-rate bullets and capped floaters.

The Nykredit Total Index includes all actively traded callable Danish mortgage bonds. The index forms the basis of four subindices. The subindices break down the mortgage bond market into four typical investment strategies within fixed-rate callable mortgage bonds, see more below.

Both Nykredit mortgage bond indices are rebalanced quarterly. The Nykredit Total Index has been compiled on the basis of a minimum requirement for the number of trading days of a bond since the last rebalancing. The mortgage bond index comprises the ten largest bond series.

The index value and the option-adjusted duration, which reflects the prepayment risk in the mortgage bond market, are published on a daily basis. Furthermore, the composition of the two indices can be viewed at nykreditmarkets.com along with historical index values and duration levels. The OAS level of the Nykredit Danish Mortgage Bond Index is available on Bloomberg, Reuters and Nykredit's webpages.

A detailed description of the indices, including specific selection criteria, is available on the website.

The trend in the index may be seen daily at Reuters (NYKI) and Bloomberg (NYKM10).

The Nykredit Danish Mortgage Bond Index

The first index Nykredit launched was the Danish Mortgage Bond Index, which is a standard Bellwether index containing the ten most liquid mortgage bond groups listed on NASDAQ OMX Copenhagen. The index basis is 5 January 1993.

Since October 2005 Nykredit's Danish Mortgage Bond Index has contained fixed-rate callables, fixed-rate bullets and capped floaters. The minimum requirement for the individual bond series to qualify for the index is an outstanding amount of DKK 5bn (EUR 667m). As the index is always rebalanced on the second trading Tuesday of a quarter (January, April, July and October), the rebalancing takes place based on outstanding amounts calculated excluding prepayments and issuance relating to the preceding borrower notification period.

Figure 26 shows the historical return on Nykredit's Danish Mortgage Bond Index compared with duration-equivalent government bond and covered bond indices. Since January 1999, the Danish Mortgage Bond Index has produced an annual pick-up relative to German Pfandbriefe of approximately 1%.

Nykredit Total Index

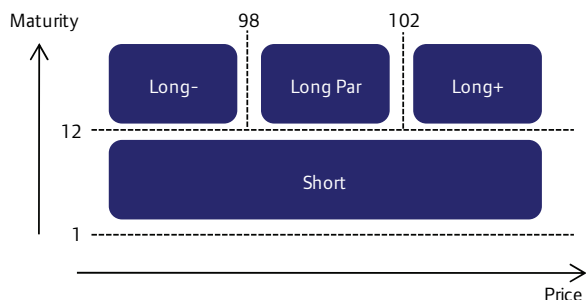
The Total Index is a standard Tracker index of the most liquid callable mortgage bond series broken down into four groups: short-term bonds with times-to-maturity of between 1 and 12 years and long-term bonds (over 12 years) grouped in three according to price: Long-: price ≤ 98 , Long Par: $98 < \text{price} \leq 102$ and Long+: price > 102 . The index basis is 13 January 1998.

Figure 25 shows the breakdown into the four subindices and illustrates the subdivision according to the price and remaining maturity of the bonds.

In line with Nykredit's Danish Mortgage Bond Index, the Nykredit Total Index is rebalanced on the second trading Tuesday of January, April, July and October. The subindices of the Total Index are rebalanced on a monthly basis.

A breakdown into subindices according to the date of maturity does not make sense when it comes to callable bonds. In consequence, the subdivision is made according to price, as the price of callable bonds can be used as an indicator of interest rate sensitivity. This also makes the breakdown into subindices independent of prepayment models as mortgage bonds trading far below par do not risk prepayment, which generally means a long duration. Similarly, when the price of these bonds is close to 100, prepayment risk will be high and the duration of these bonds will be short. Consequently, the four subindices reflect common investment strategies of different investors.

Figure 25: Breakdown of Nykredit's Total Index



To be included in Lehman's indices, mortgage bonds must have an outstanding amount of at least EUR 300m, an investment grade rating from either Moody's or Standard & Poor's and a maturity longer than one year.

If Denmark joins the euro area, more foreign index providers are expected to start taking an interest in the Danish mortgage bond market. This trend will increase the exposure of and focus on the Danish mortgage bond market in general. The size of the Danish mortgage bond market would have a weighting of approximately 2.5% in an overall European index similar to Lehman's if Denmark were to join the euro.

The Total Index is an index of the most traded callable mortgage bonds divided into four groups:

Short bonds with times-to-maturity of between 1 and 12 years.

Long bonds (over 12 years) are divided into three groups according to price: Long- ≤98, Long Par 98 < price ≤102 and Long+ >102.

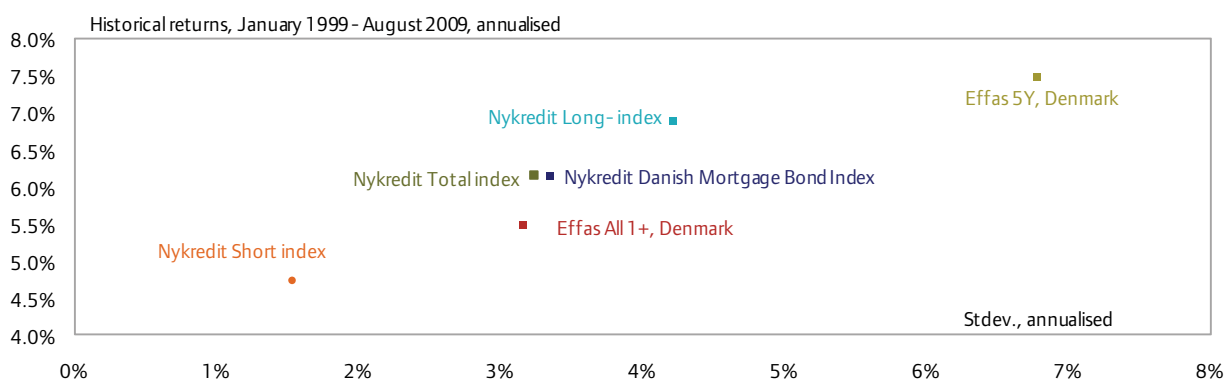
Source: Nykredit

Foreign index providers

As the first foreign investment bank, Lehman Brothers Inc. introduced an index based on Danish mortgage bonds on 1 December 2002. The introduction should be seen in the light of the growing share of foreign ownership in Danish mortgage bonds.

On 1 July 2004, Lehman Brothers included Danish non-callable bullet bonds, without embedded options, in its Pan-European and Global Aggregate indices. Euro-denominated bonds of this type were also added to the Euro Aggregate Index.

Figure 26: Nykredit's Danish Mortgage Bond Index compared with the Effas Bond Index



Return relative to the risk of investing in mortgage bonds compared with other total return bond indices since January 1999. The standard deviation has been computed based on daily returns. Effas All 1+ shows DKK government bonds.

Source: Bloomberg and Nykredit

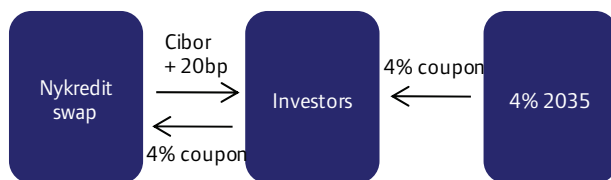
DERIVATIVES STRATEGIES

Interest rate derivatives may be applied for asset swap packages based on callables as well as capped floaters. The bonds are asset swapped so that investors receive a variable rate plus a spread, while eliminating prepayment, interest rate and volatility risk.

Asset swap of callable bonds

Figure 27 illustrates the structure of asset swap packages. The asset swap package based on callables can only be established with bonds trading below par.

Figure 27: Asset swap package



Purchase of callable bond and asset swap.

Source: Nykredit

The spread which investors receive is often referred to as the Cibar spread. This spread will be lower than the OAS. The reason is that an asset swap package protects investors from a 100% prepayment rate on a subsequent payment date. By contrast, the OAS is estimated on the basis of statistical assumptions of borrowers' historical prepayment behaviour which only rarely results in prepayment rates over 50% on any payment date. Moreover, some borrowers will never prepay their loans whatever the incentive. The OAS therefore factors in that borrower behaviour is not necessarily rational.

Investors are buying the mortgage bond funded at 3M Cibar, while entering into a payer interest rate swap where investors pay the fixed coupon rate of the bond and receive a variable rate plus a spread. The interest rate swap should have the same amortisation profile as the mortgage bond. Furthermore, investors will be buying the right to cancel the interest rate swap on all future payment dates concurrently with borrowers' loan prepayment. This can be done by purchasing a Bermudan swaption. Such a construction is often referred to as a cancellable asset swap package. The spread is often fixed so that the price of the overall package will be 100.

As an alternative to hedging with Bermudan swaptions, many investors choose a less complex strategy by hedging negative convexity and vega through swaptions.

Asset swaps of capped floaters

Asset swaps of capped floaters are in principle very simple as investors only have to buy a cap equal to the embedded cap of the bond. This provides investors with a floating rate (eg 6M Cibar) plus a spread.

The challenge for asset swap investors is chiefly the stochastic element of amortisation. When establishing an amortising cap, investors must beforehand make an assumption as to the expected amortisation. The prepayment option at a price of 105 also poses certain challenges in asset swap packages. However, the value of the option is so negligible that investors often opt to ignore it in relation to hedging.

Example: CF 5% 2038 has a coupon cap of 5% and pays 6M Cibar plus 80bp. The embedded coupon cap of the bond is 5% and the strike rate can then be calculated as $5\% \times 360/365 - 80\text{bp} = 4.1315\%$. The "Cibar spread" can be calculated from the bond clean price and the cap premium as shown in Table 18.

Table 18: Cibar spread calculation

Bond clean price	94.98
Amortising DKK-cap strike 4.13	9.90
Up-front above par	-4.88
1bp up-front	11.25
Amortised up-front	-43.37
Bond spread	80.00
Cibar Spread, bp	36.63

When calculating Cibar spreads for capped floaters, practice prescribes ignoring the prepayment option at a price of 105.

Source: Nykredit

The easiest product to hedge with caps is 10Y capped floaters with IO periods where cash flows are near-perfect bullets. In practice, many investors have opted to hedge the vega risk of capped floaters by buying plain vanilla EUR caps. The use of plain vanilla EUR caps makes it possible to hedge delta, gamma and vega risk.

MODELLING DANISH MORTGAGE BONDS

This section reviews the pricing models applied to fixed-rate callable mortgage bonds as well as capped floaters. Conceptually, the pricing of non-callable bullets is straightforward. The payments of a bullet are discounted with eg the swap curve plus a constant yield curve spread (which generally increases with the maturity of the bond). The pricing of fixed-rate callable mortgage bonds² and capped floaters³ is, however, more complex due to the embedded options.

Pricing of fixed-rate callable bonds

In principle, a fixed-rate callable bond constitutes a portfolio of a non-callable bond and a short position in an American call option on that bond (with a strike price of 100) reflecting the embedded prepayment option. However, for pricing purposes, the prepayment option cannot be treated as a standard American call option since borrowers do not pursue rational exercise strategies. There are no prepayments when a mortgage bond trades below par (consistent with the rational exercise rule), but for bonds trading above par, there is usually substantial variation in observed prepayment rates over time and across different coupons and maturities.

Prepayment models

Instead, an empirical prepayment model estimated on the basis of historical data is needed to price fixed-rate callable mortgage bonds. This model predicts the prepayment rate for a given payment date as a function of the yield curve (through the refinancing rate) and other factors affecting the level of prepayments such as the size of the loans.

The most important factors in the prepayment model developed by Nykredit Markets are discussed below. In order to calculate theoretical (model) bond prices and key figures such as option-adjusted duration, the prepayment model is combined with a stochastic term structure model which is calibrated to the Danish yield curve (swap or government) and to implied volatilities for Danish caps and swaptions. The stochastic term structure model provides a range of possible yield levels on a number of future dates and attached probabilities at such yield levels. The technicalities of the calculations are outlined below.

Refinancing rates and prepayment gains

The most important factor affecting the prepayment rate is the gain from refinancing to a lower rate. The gain is defined as the percentage reduction in the mortgage payments on the new loan, taking taxation and prepayment costs into account. When prepaying a loan, borrowers face both fixed costs and costs varying with the size of the relevant loan. The gain calculation is based

on the total payment for the next year or the present value of all remaining payments using the after-tax refinancing rate on the new loan as the discount rate. The Nykredit Markets prepayment model uses the present value criterion, but in most cases, the difference between the two gain definitions is quite small.

The refinancing rate assumes that the new loan is a fixed-rate mortgage with the same maturity as the existing loan. In order to address the growing importance of floating-rate and adjustable-rate mortgages (to refinancing), the model prepayment rate also depends on the slope of the yield curve as discussed below.

Loan size

On average, borrowers prepay large loans more actively than small loans. This effect is illustrated in Table 19, which contains subgroup prepayment rates for five loan size intervals of the bond 5% NYK 2035 (the subgroup prepayment data are described below). For realistic parameter values, the bulk of the difference between the prepayment rates of large and small loans reflects borrower prepayment strategies and not the effect of fixed prepayment costs. For the investor, however, this distinction is largely irrelevant, and the prepayment model must simply take into account that large loans prepay faster than small ones.

Cash loans vs bond loans

The after-tax payments on cash loans are smaller than on corresponding bond loans. This implies that the prepayment gain is smaller for a cash loan than for a bond loan since the tax advantage is lost on prepayment. Therefore, the prepayment rate of a given mortgage bond should be inversely related to the average cash rate of the underlying loans. The Nykredit Markets prepayment model uses the average cash rate when calculating the gain from prepayment (in this connection, bond loans can be regarded as cash loans with a cash rate equal to the coupon rate).

Time-to-maturity of the loan

The required gain needed to trigger prepayment increases with the time-to-maturity of the loan. This is to be expected if borrowers take the time value of the prepayment option into account when formulating prepayment strategies. Furthermore, with respect to loans with short maturities, the liquidity effect of refinancing on a loan with a long maturity becomes more important (as discussed above, the gain used in the prepayment function assumes that the new loan has the same maturity as the existing loan).

Spread between long- and short-term rates

In the Nykredit Markets prepayment model, there is a positive relationship between the slope of the yield curve (the spread between long- and short-term rates) and prepayment rates. When the yield curve is steep, borrowers are more likely to refinance their existing fixed-rate mortgage into a floating-rate or

² Fixed-rate callable bonds are callable at par (100).

³ Capped Cbor-linked floating-rate bonds are callable at a price of 105.

adjustable-rate mortgage, where the prepayment gain is higher. This has been the case throughout most of 2009.

Table 19: Subpool prepayment rates for 5% NYK 2035

Payment date	Aggregate	Loan size (DKK 1,000)				
	Prepayment rate	0-200	200-500	500-1,000	1,000-3,000	3,000-
1 Jan 06	18.90	16.31	12.12	18.11	20.03	23.95
1 Oct 05	24.39	13.52	9.87	14.79	24.13	43.57
1 Jul 05	16.64	9.19	7.13	9.72	14.35	30.30
1 Apr 05	15.05	11.34	6.41	8.77	12.39	25.91
1 Jan 05	0.10	0.63	0.45	0.42	0.57	0.46
1 Oct 04	0.04	0.43	0.43	0.43	0.43	0.43

On average, borrowers prepay large loans more actively than small loans – illustrated by subpool data on 5% NYK 2035.

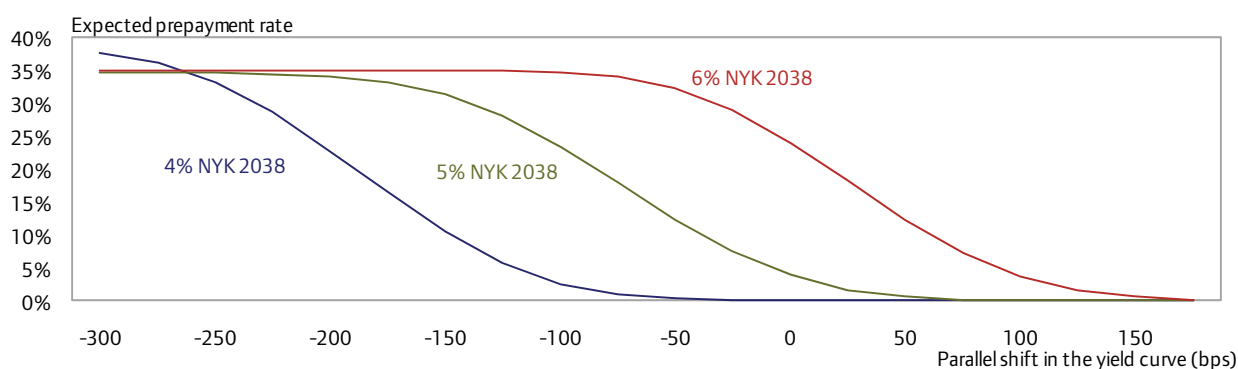
Source: Nykredit

Modelling the heterogeneity of prepayment rates

As mentioned above, there is substantial variation in prepayment rates observed over time and across different bonds. The main systematic difference is related to the gain from prepayment, but there is also a tendency for prepayments to slow down over time (other things being equal). The reason for this effect, called burnout, is that the most aggressive borrowers leave the mortgage pool first, and the remaining borrowers prepay less aggressively on average. There are two ways of capturing this effect in the prepayment model.

Firstly, the prepayment function may depend on the pool factor, which is the ratio of the current debt outstanding to the debt amount before the prepayments started. The main problem with the pool factor approach is that the pricing problem becomes path dependent, and this makes the numerical procedures used for valuation (pricing) more time-consuming.

Figure 28: Prepayment function at September 2009



On a parallel yield curve shift of -50bp, the model will estimate a prepayment rate of 12% for 5% NYK 2038 on the next payment date.

Source: Nykredit

Secondly, the burnout behaviour can be modelled using mortgage subgroups, for example based on the size of the loan. If there are different prepayment functions for each subgroup, and if the relative composition changes over time towards the slowly prepaying subgroups, the aggregate prepayment rate will slow down. The main advantage of the subgroup approach is that

there are no path dependencies within each subgroup. This means, for example, that one-factor PDE methods can be used for pricing. Apart from the different prepayment functions, the subgroup approach only requires the initial weights of each subgroup in order to calculate the theoretical price of a mortgage bond. This approach is most effective when the subgroup hetero-

geneity is observable, primarily because the parameters of the prepayment function must be estimated for each subgroup.

The Nykredit Markets prepayment model uses borrower subgroups based on the five loan size intervals shown in Table 19. Subgroup prepayment rates are not directly available since Danish mortgage banks only supply data on the total prepayment rate of each bond. However, mortgage banks provide a breakdown of the total debt outstanding grouped in the five loan size intervals, cf "Market data supplied by mortgage banks", and Nykredit Markets calculates the subgroup prepayment rates based on changes in the debt outstanding of each subgroup. This type of calculation must include corrections for new issuance activity in the open series and buybacks when a bond trades below par. The internal subgroup prepayment data are used to estimate the parameters of the prepayment function.

The prepayment function

The prepayment function of subgroup k is specified as $\lambda_k = s(L_k)\Phi(G_k)$ where G_k is the actual prepayment gain, $\Phi(x)$ is a cumulative probability distribution function (truncated normal in Nykredit Markets's model), and $s(L_k)$ is a linear spline function of the loan size L_k . The multiplication by the spline function $s(L)$ serves two purposes. Firstly, the upper bound of the expected prepayment rate of a given payment date is below 100%. Secondly, the function determines the heterogeneity between the different subgroups in a simple way (the parameters in $\Phi(x)$ are

constant across subgroups). The mean of the distribution $\Phi(x)$ depends on two explanatory variables, the time-to-maturity of the underlying loans (positive coefficient) and the spread between long- and short-term yields (negative coefficient). Figure 28 contains the prepayment function of the bonds 4% NYK 2038, 5% NYK 2038 and 6% NYK 2038 on 1 September 2009. Note that the upper bound of the expected prepayment rate is higher with respect to 4% NYK 2038. This reflects a difference in the borrower distribution. Since there have already been some prepayments in the 5% bond, the remaining borrowers have smaller loans on average.

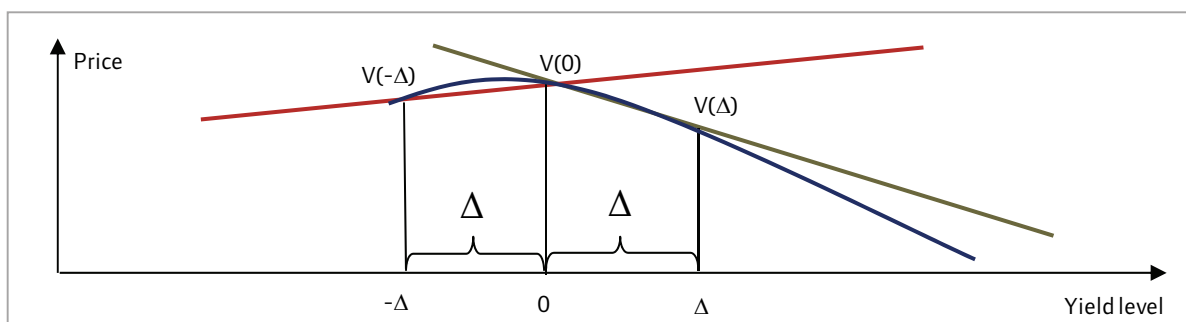
Numerical pricing procedures

The stochastic term structure model is the extended Vasicek model:

$$dr(t) = \{\theta(t) - \kappa(t)r(t)\}dt + \sigma(t)dW(t)$$

where the time-dependent functions $\sigma(t)$ and $\kappa(t)$ are calibrated to implied volatilities for DKK-denominated caps and swaptions. The time-dependent function $\theta(t)$ is used to calibrate to the initial yield curve. The extended Vasicek model has closed-form expressions for European bond options (including caps and swaptions), and this facilitates an efficient calibration method.

Figure 29: Calculation of adjusted convexity



Option-adjusted convexity can be interpreted as the change in the dollar duration on yield curve shifts.

Source: Nykredit

More complex options must be priced using numerical methods. Here, Nykredit Markets uses an implicit finite-difference PDE implementation of the extended Vasicek model. The backward recursion is a tridiagonal system of equations $L_m V_m = R_m V_{m+1}$ where V_m is the value of the claim at time t_m in the N states of the PDE discretisation. Since the matrix L_m is tridiagonal, this system of equations can be solved very fast. The main advantage of the PDE approach compared with for example trinomial trees is that the time and state discretisations can be chosen independently. For the prepayment model, the PDE grid must be solved for each mortgage subgroup, so that the current price can be calculated as

$$V_0 = \sum_{h=1}^H w_h V_{0,h}$$

where w_h is the initial weight of subgroup h , and $V_{0,h}$ is the theoretical bond price at time 0 ("today") when using the prepayment function for subgroup h . The backward recursion for the value of each mortgage subgroup consists of three equations:

$$L_m V_{m,h}^{NC} = R_m (V_{m+1,h} + c)$$

$$L_m V_{m,h}^E = R_m (100 + c)$$

$$V_{m,h} = V_{m,h}^{NC} - \lambda_h(t_m)(V_{m,h}^{NC} - V_{m,h}^E)$$

where c is the quarterly coupon rate and $\lambda_h(t_m)$ is the prepayment rate for subgroup h at the decision date t_m (two months before the payment date, corresponding to the notice period for prepayment). Note that the value of the bond is split into two parts at the decision date: V^E is the value of the prepaid (exercised) part, and V^{NC} is the value of the non-prepaid part.

Between the decision date and the previous payment date, there are no payments and/or prepayment events, and the normal backward recursion is used. The option-adjusted dollar duration is calculated using the central finite-difference formula:

$$D^{OA} = \frac{V(-\Delta) - V(\Delta)}{2\Delta}$$

where $V(\Delta)$ is the theoretical mortgage price after a parallel shift of the yield curve of Δ . In practice, $\Delta = 10bp$ is used. This calculation is completely analogous to the one used for non-callable bonds except that the theoretical mortgage pricing model is used to obtain $V(\Delta)$.

Option-adjusted convexity, which can be interpreted as the change in the dollar duration when the yield curve changes, is given by the formula:

$$C^{OA} = \frac{V(\Delta) + V(-\Delta) - 2V(0)}{\Delta^2}$$

The option-adjusted convexity is also the average of the one-sided durations when the yield curve changes by Δ and $-\Delta$ basis points, respectively. Figure 29 illustrates this interpretation of C^{OA} .

Table 20 contains key figures on benchmark 30Y mortgage bonds. Note that all bonds have negative convexity because of the prepayment option.

Table 20: Key figures at 1 September 2009

ID	Bond	Price	Yield	Swap OAS	OABPV	OAC
975729	4% NYK 2035	95.13	4.56	23.76	6.57	-1.28
976164	4% NYK 2038	94.70	4.59	25.77	6.77	-1.20
975362	5% NYK 2025	102.90	4.62	33.71	2.25	-2.36
976970	5% NYK 2041	99.13	5.17	42.93	5.05	-3.12
977012	5% NYK 2041 IO	97.65	5.26	30.12	6.38	-3.26
976989	6% NYK 2041	102.73	5.88	39.46	1.38	-1.76
977020	6% NYK 2041 IO	102.48	5.95	26.59	1.77	-2.39

All bonds have negative convexity because of the prepayment option.

Source: Nykredit

Pricing of capped floaters

Capped floaters carry a floating rate, are callable (often at 105) and have an embedded option in the form of an interest rate cap. The cap has a fixed strike throughout the maturity of the bond, typically up to 30 years. The repayment profile will be of the annuity type where amortisation may be deferred for the first 10 to 30 years. A characteristic of Danish capped floaters is that the annuity rate tracks a given interbank rate. This means that the repayment profile of the bonds is stochastic as the annuity rate is fixed on the basis of the development in 6M CIBOR. As the bonds have embedded options, a stochastic yield curve model is required for the pricing. This model must be calibrated to basis options (such as caps and swaptions) matching the implied options embedded in the capped floaters. We apply the same yield curve model as to callable bonds, i.e. the extended Vasicek model. In order to allow for the volatility smile, the extended Vasicek model is calibrated to caps with the same strike rate as the capped floaters. Consequently, a volatility calibration specific to the individual capped floaters is applied.

Calibration – capped floaters

The yield curve is naturally calibrated to the Danish swap curve. It makes no sense to calculate key figures relative to the Danish government bond curve as the yield curve is also applied to determine future coupon fixings. In the ordinary mortgage bond model (callable), the Vasicek model's volatility parameters are calibrated to at-the-money (ATM) swaptions and caps. However, this method cannot be applied to capped floaters.

One of the limitations of the extended Vasicek model is the lacking possibility of matching the option prices at all strike rates. The Vasicek model has constant basis point volatility, which

means that Black-76 (relative) volatilities decline monotonously with the strike rate. This correlation is a good match with strike rates that are moderately lower than ATM strikes where the Vasicek model is able to match the volatility skew seen in the market (that lower strikes are trading at higher Black-76 volatilities than ATM strikes). The prepayment option in the traditional fixed-rate mortgage bond is typically slightly out-of-the-money, which is well in line with what an extended Vasicek model calibrated to ATM strikes is able to handle.

Where capped floaters are concerned, quite the opposite is the case as the option element has higher strike rates than ATM. The Vasicek model calculates Black-76 volatilities in respect of these caps that are somewhat lower than ATM caps. This is not in line with what can be observed in the market. In other words, a Vasicek model calibrated to ATM options would not value capped floaters correctly. We have therefore calibrated the Vasicek model to caps with a strike rate matching the strike rate of the relevant capped floaters.

The prepayment option at a price of 105 causes slightly more problems as the utilisation of the option depends on the borrower behaviour in principle in the same way as fixed-rate callable mortgage bonds. However, there is no need to develop a completely new state-of-the-art model as the option is relatively insignificant in the overall picture. We opt for the pragmatic solution where 25% of borrowers exercise the option if it is in the money on a given payment date. This share is in no way critical to the subsequent conclusions. The pricing is based on a constant option-adjusted spread (OAS) – the normal procedure when it comes to all other bonds with or without embedded options.

Table 21: Theoretical prices and key figures – capped floaters (1 September 2009)

ID	Bond	Price	Swap OAS	OABPV	OAC
976601	CF 5% NYK 2018 IO	97.34	23.26	2.06	-0.81
976148	CF 5% NYK 2038	96.73	32.36	4.43	-1.01
976156	CF 5% NYK 2038 IO	95.33	38.98	4.94	-1.05
975966	CF 6% NYK 2038	97.23	34.76	2.96	-0.81
975974	CF 6% NYK 2038 IO	96.44	37.85	3.29	-0.87

The capped floaters have positive duration and negative convexity.

Source: Nykredit

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BUY:

In our view, the bond is fairly inexpensive relative to comparable peers in either the bond or derivatives markets. We expect that the bond will offer a higher return than its peers on a short-term horizon, ie usually three months.

SELL:

In our view, the bond is fairly expensive relative to comparable peers in either the bond or derivatives markets. We expect that the bond will offer a lower return than its peers on a short-term horizon, ie usually three months.

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OVERWEIGHT:

In our view, the return on the bond segment will be higher than the return on the total Danish bond market (Danish government and mortgage bonds) in the next three months.

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In our view, the return on the bond segment will be in line with the return on the total Danish bond market (Danish government and mortgage bonds) in the next three months.

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In our view, the return on the bond segment will be lower than the return on the total Danish bond market (Danish government and mortgage bonds) in the next three months.

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