

Sparinvest Long Danish Bonds  
**The Danish Bond Market**  
July 2010

## Summary

This report is aimed at investors, client managers, analysts and others with an interest in the Danish bond market. The main emphasis is on the Danish covered bond market. The report includes a detailed description of investor security on investments in Danish covered bonds and the entire legal framework, as well as an overview of the products offered in the Danish market.

## The Danish Bond Market

The Danish bond market consists of around 2300 bond series listed on Copenhagen's stock exchange. Danish bonds fall into 4 distinct categories:

- i) Government bonds issued by the Kingdom of Denmark;
- ii) Mortgage bonds, covered bonds, and covered mortgage bonds issued by specialist mortgage credit institutions and banks;
- iii) Bonds issued by regional authorities, municipalities, supranational organizations and government guaranteed entities;
- iv) Corporate bonds.

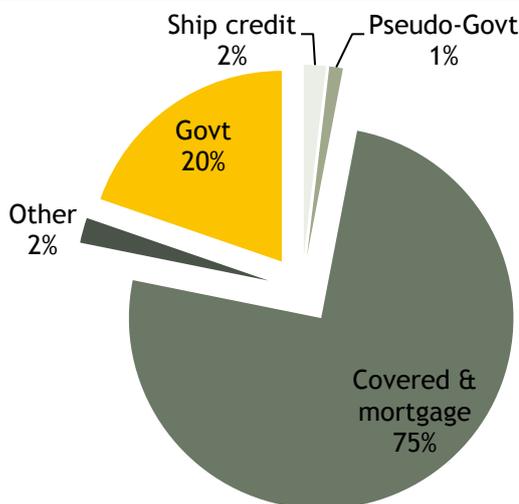
The first 3 categories comprise almost the entire market. Historically, Danish corporates have only to a minor extent relied on debt capital markets for funding purposes. The largest corporates have been issuing EUR- and USD-denominated bonds listed on foreign exchanges and financial institutions are regularly issuing benchmark-sized bonds on these markets as well.

Following the financial crisis in 2008 and the subsequent defaults of several Danish mid-sized banks, the market for senior unsecured and lower subordinated bank debt has now completely disappeared and has been replaced by government guaranteed bonds. Issuance of these bonds has risen dramatically in 2010, as banks are hoarding cash prior to the expiry of the unlimited guarantee on bank deposits in Danish banks which will occur on September 30<sup>th</sup> 2010. These bond issues will however not be a permanent addition to the Danish bond market as they:

- Are short-dated, with maturities less than 3 years;
- To a large extent, have private placement character and may even be unlisted;
- Pertain to a singular financial crisis that is not likely to be repeated under the same circumstances.

This report will focus on the two categories of government bonds and covered bonds, respectively, as these make up the bulk of the market.

EXHIBIT 1: COMPOSITION OF THE DANISH BOND MARKET



## The Danish Government Bond Market

### Issuer

Issuance of Danish government bonds and bills is done by the Debt Management Office (DMO) which is located under the Danish Central Bank. The DMO publishes its funding profile in December and revises it at quarterly meetings. The DMO-published report *Danish Government Borrowing and Debt* released every January/February describes development in borrowing and debt over the preceding year, and provides an overview of the funding profile for the current year.

The long-term rating of both local and foreign currency debt by S&P, Moody's and Fitch is AAA/Aaa/AAA with stable outlook.

The total outstanding amount of bonds issued by the kingdom of Denmark by the end of 2009 was approximately DKK570bn in domestic debt and DKK100bn in foreign debt. To calculate the free float, the holdings of Danish government bonds with DSP (the social pension fund) as well as other government funds have to be deducted, which brings down available bonds considerably.

To calculate total debt, proceeds of the government's account with the Danish Central Bank have to be taken into account. For 2010, the IMF expects total debt level to be 46% of Gross Domestic Product. This compares favourably with other comparable countries.

## EXHIBIT 2: EXPECTED PUBLIC DEBT LEVELS 2010

	Gross public debt	Structural primary balance	Required fiscal adjustment 2010-20
Greece	129,5	-6,4	15,5
Ireland	74,5	-8,7	13,5
Japan	228,6	-6,7	13,4
United States	91,8	-6,4	10,6
United Kingdom	79,6	-6,2	10,4
Spain	63,7	-6,1	9,4
Portugal	83,3	-3,7	7,5
France	84,9	-2,1	6
Belgium	100,9	-1,1	5,8
Austria	72,9	-2,7	5,7
Netherlands	63,9	-3,3	5,3
Italy	117,6	0,5	4,9
Germany	77,3	-1,7	4,4
Iceland	131,2	0,1	3,8
Norway	67,4	4,4	2,2
Sweden	44,7	-1,5	1,9
Finland	48,1	-0,2	0,7
Denmark	46,0	0,6	-0,1

Source: IMF forecasts for 2010. All figures in percent of GDP  
Structural primary balance is underlying net state of public account excluding business cycles and other temporary conditions. Last column fiscal adjustment required 2010-20 to bring debt to 60% of GDP in 2030.

### Investor base

The investor base in Danish government bonds is well diversified with life insurance companies holding around 40% of DKK-dominated government bonds. Foreign investors account for around 30% and banks and public funds own 15% each.

### Outlook

Danish government bonds have closely tracked their German peers during most of 2009 and 2010. Coming from a slightly higher level, performance has even been higher over this period. Given the relatively low debt levels and the favourable funding situation, this situation is likely to continue for some time to come. Parts of the Danish government bond market are dominated by domestic investors with particular needs (e.g. life insurance and pension funds in 30-year bonds due to their long-dated liabilities) that will continue to support the market.

As of June 2010, the DMO had issued 108% of its funding target for 2010 (excluding issuance of government bills).

## The Danish Covered Bond Market

### Overview

The Danish covered bond market was established after the great fire of Copenhagen in 1795. As a consequence of the huge reconstruction costs, the first mortgage bank was founded in 1797. The idea was that by pooling loans, borrowers would be able to achieve a better deal from lenders than they would be able to negotiate on individual basis. This bank would provide loans secured by a mortgage on real property and with joint and separate liability for borrowers by issuing negotiable debt securities. A similar system had been introduced in Germany in 1769. Over the course of more than 200 years the system has evolved from its origin to become a central part of the Danish economy rendering the Danish mortgage market one of the largest in the world relative to Gross Domestic Product (GDP) as well as in absolute terms. No mortgage bank has ever defaulted in Denmark. The credit history of Danish mortgage bonds is by a small margin better than that of the Kingdom of Denmark which went bankrupt in 1813!

### Legal framework

Mortgage lending has been regulated in Denmark by special mortgage legislation since 1850. The issuance of mortgage bonds is regulated by the Danish Financial Business Act and Executive Orders and the Danish Mortgage Credit Loans and Mortgage Credit Bonds Act. From a societal point of view, the aim of the legislation is to provide mortgage lending to homeowners at reasonable costs and to protect mortgage bond investors. The key elements of the regulation are:

- Mortgage issuers must operate subject to a balance principle limiting market risk exposure to a minimum;
- Regulation on mandatory over-collateralization on risk-weighted basis;
- Regulation on loan-to-value (LTV) limits, maturities and repayment profiles;
- Mortgage bond holders hold a preferential claim should a mortgage institution be wound up by the courts;
- Legal framework is supported by the Danish Land Registration and Cadastral System;
- An efficient compulsory sale system;
- Close supervision by the Danish FSA.

The legal framework for Danish mortgage lending has been amended many times over its history. Since the 1980's the main changes have had the purpose to liberalize and deregulate different aspects of the original Act and/or to meet obligations relating to Denmark's membership of the European Union.

The latest amendment was implemented in 2007 in order to achieve compliance with the EU Capital Requirements Directive (CRD). This

directive defines the basis for preferential treatment with respect to regulatory capital, i.e. the risk weightings that apply to assets on the balance sheets of financial institutions. Moreover the new framework brings Danish legislation in line with other European covered bond legislations.

This amendment of the Danish mortgage bond legislative framework featured three main changes:

1. The specialized mortgage bank principle was amended.
2. Two new bonds types were introduced in addition to mortgage bonds (RealkreditObligationer/RO), such that 3 different types of bonds co-exist, namely:
  - Mortgage Bonds (RealkreditObligationer/RO);
  - Covered Bonds (Særligt Dækkede Obligationer/SDO);
  - Covered Mortgage Bonds (Særligt Dækkede RealkreditObligationer/SDRO).
3. The mandatory balance principle was changed to a new balance principle with two options:
  - General balance principle;
  - Specific balance principle.

The term *Mortgage Bond* (RealkreditObligation or RO) denotes bonds issued under the old framework pre-2008, i.e. bonds issued by mortgage banks out of existing capital centres (cover register). All RO bond series closed for issuance by 31 December 2007 are 'grandfathered' and have a 10% risk weighting according to the CRD directive, whereas open RO bond series carry a 20% risk weight. The grandfathering principle means that these bonds are considered compliant with the CRD directive and have 10% risk weight as long as bond series remain closed for issuance, even though under current rules, they would not qualify.

Prior to 2008, the risk weighting of Danish mortgage bonds was governed by the UCITS directive which in turn stipulated a 10% risk weight if the criteria of UCITS 22(4) were fulfilled. The terms *Covered Bonds* (SDO) and *Covered Mortgage Bonds* (SDRO) apply to bonds that fulfil the new and stricter CRD requirements, namely explicit eligibility criteria for collateral assets, stricter requirement for valuation of cover assets, and continuous monitoring of LTV limits.

The main difference between SDOs and SDROs is that only specialized mortgage banks may issue SDROs. Furthermore, the eligibility criteria for SDO cover assets are slightly more comprehensive.

The old law required an almost complete matching of disbursed mortgage loans and issued bonds, i.e. a pass-through system with tap issuance. The new legislation requires issuers to choose between a general or a specific balance principle for each cover register (capital centre) within the issuer. The balance principle stipulate rules for calculating financial risk inherent

in each cover register/capital centre. Various stress test scenarios are conducted to determine interest rate, foreign exchange, liquidity and option risk. Issuers have to decide for each capital centre (cover pool) whether they want to use the general or the specific balance principle.

The specific balance principle is an almost verbatim copy of the balance principle previously employed under the old legislation. The specific balance principle is stated in terms of (present values of) all payments received and paid by the capital centre, relative to the *capital base* of the issuer. Options and other instruments with asymmetric payoffs are limited to maturities less than four years, and this renders hedging of early prepayment options using financial instruments impossible.

**EXHIBIT 3: RISK LIMITS UNDER THE SPECIFIC BALANCE PRINCIPLE**

	Stress scenario	Limit relative to capital base
	±100bp	PV of all payments paid and received < 0,1%
Interest rate	+/-100bp < 3 months, -/+100bp > 10 years, prop. shift from 3 months to 10 years	PV of all payments paid and received < 0,1%
	+/-300bp for option-like payoffs, -/+100bp for other payoffs	PV of all payments paid and received (for option-like payoffs scaled by 1/3) < 0,1%
FX		10-day 99% VaR < 0,1%
Option		Maturity < 4 years
Liquidity		Temporary future liquidity deficit limits: In year 1-3 : < 25% In year 4-10: < 50% In year 11- : < 100%

OC = Over-collateralization, PV = Present Value, VaR = Value at Risk

The main adjustment to the previous balance requirement is that issuers now have larger limits for making loan redemptions using bonds from similar issuers and having roughly similar cash flow. In case borrowers wish to repay their loan in full, this is normally done by buying the bonds (used for loan funding) in the market. The issuer subsequently cancels the loan and reduces the notional amount of the bond correspondingly. In case the bond is held by few investors and bond holders try to charge excessive prices for the bonds, issuers have the possibility to use similar bonds instead. The new legislation thus aims to better protect borrowers against the effects of bond lock-ups.

Under the general balance principle, risk limits are stated in terms of the mandatory and voluntary overcollateralization of cover pools.

**EXHIBIT 4: RISK LIMITS UNDER THE GENERAL BALANCE PRINCIPLE FOR SD(R)Os**

	Stress scenario	Mortgage Bank	Commercial Bank
Interest rate	±100bp	1% of mandatory OC + 2% of voluntary OC	- 10% of voluntary OC
	±250bp	5% of mandatory OC + 10% of voluntary OC	- 100% of voluntary OC

	+/-100bp < 3 months, -/+100bp > 10 years, prop. shift from 3 months to 10 years	5% of mandatory OC + 10% of voluntary OC	- 100% of voluntary OC
FX	±10% (EUR)	10% of mandatory OC + 10% of voluntary OC	- 10% of voluntary OC
	±10% (EEA, CHF)	1% of mandatory OC +	-
	±50% (other)	1% of voluntary OC	10% of voluntary OC
Option	±1% volatility	0.5% of mandatory OC + 1% of voluntary OC	- 5% of voluntary OC
Liquidity		Interests received > interests paid over 12 consecutive months. Future payments received > Future payments paid (PV basis)	Interests received > interests paid over 12 consecutive months. Future payments received > Future payments paid (PV basis)

OC=Over-collateralization, PV=Present Value

In Denmark, the covered bond legislation specifies the following eligibility criteria for the cover assets. In general, cover pools which comprise public sector loans and mortgage loans are allowed. The geographical range of eligible mortgage loans is generally limited to Denmark, although the Danish FSA can authorise the issuer to include mortgage loans which have been originated outside Denmark.

#### EXHIBIT 5: OVERVIEW OF ELIGIBLE COVER ASSETS

	Mortgage loans	Public loans	Ship loans	Substitute collateral
RO	x	x		
SDRO	x	x		X
SDO (com. bank)	x	x	x	X
SDO (mortg. bank)	x	x		X

The term *Substitute collateral* covers exposure to credit institutions and is limited to 15% of assets and must not have a risk weighting of more than 20% (50% risk weight if the debt matures within 100 days or less).

Ship mortgage loans as collateral are only allowed for SDOs issued by commercial banks and these mortgages have to be kept in a separate register and cannot be mixed with other collateral types.

All cover assets are held on the balance sheet of Danish issuers. Commercial banks enter cover assets in a special cover register. Mortgage banks must assign cover assets and covered bonds to specific capital centres within their balance sheet. In contrast to several other covered bond frameworks in Europe, there is no specific cover pool monitor in Denmark. Instead, monitoring tools are supervised by the Danish FSA and issuers report on a quarterly basis.

In case of insolvency of the issuer, the cover pool is bankruptcy remote. The cover pool is segregated and a special cover pool administrator is

assigned. Neither the insolvency of an issuer nor the failure to provide additional collateral triggers the acceleration of covered bonds. Derivatives rank *pari passu* with covered bonds in case of asset segregation and have a preferential claim before other creditors, except for the cover pool administrator. Should the original capital centre of a mortgage bank turn out to be insufficient to meet the obligations, then the covered bond holders have a preferential claim against excess capital of other capital centres as well as a senior unsecured claim against the issuing bank. At commercial banks, however, investors rank *pari passu* to ordinary senior investors in terms of claims against assets that are not in their capital centre.

### Loan-To-Value and security mechanisms

The Danish covered bond system provides high security by means of specific regulations on valuations of underlying cover assets, i.e. the so-called Loan-To-Value (LTV).

- Issuers are supervised by the Danish FSA.
- There are specific LTV limits depending on loan type, repayment profile, property use.
- These LTV limits are regularly revised with predefined mechanisms in case property prices decline. In case limits are exceeded, additional collateral must be provided to comply with limits.
- Valuation of cover assets must be regular and independent.
- Mortgage banks must provide mandatory overcollateralization of 8% (commercial banks need not).
- Mortgages must be kept in the Danish Land Register (kept by the Danish district courts).

Under the previous legislation, a continuous review of collateral/LTV did not exist. To receive a 10% risk-weighting, the amended Danish law has been aligned with CRD requirements and LTV limits are monitored over the lifetime of loans. Another major change was the implementation of a general market value approach vs. the former going concern approach. Moreover, the Danish FSA has adopted valuation principles for covered bond collateral.

**EXHIBIT 6: GENERAL LTV LIMIT FOR MORTGAGE AND COVERED MORTGAGE BONDS**

Property usage	RO		SDO & SDRO	
	Max. LTV	Loan terms	Max. LTV	Loan terms
Private owner-occupied (for permanent residence)	80	30	80 75	30 No limits
Holiday homes	60	30	60	30
Private rental properties	80	30	80	30
Private co-operative housing associations	80	30	80	30
Social housing associations	New	40/30 <sup>2)</sup>	84 <sup>1)</sup>	40/30 <sup>2)</sup>
	Existing	80	30	80 <sup>3)</sup>
Agriculture, forestry	70	30	60/70 <sup>4)</sup>	30
Properties for social, cultural and educational purposes	80	30	60/70 <sup>4)</sup>	30

Offices and shop premises	60	30	60/70 <sup>4)</sup>	30
Manufacturing and industry	60	30	60/70 <sup>4)</sup>	30
Undeveloped land	40	30	40	30

Remarks

- 1) Public guarantee for LTV beyond 60%
- 2) Bond funding type is decided by the Ministry of Interior. Current choice is 30-year adjustable-rate mortgage loans with yearly refinancing
- 3) Public guarantee for LTV beyond 60%
- 4) LTV limit is 70% if additional collateral is posted for LTV beyond 60%

For commercial mortgage loans to industrial properties it is worth noticing that, under the previous framework, it was possible to assess values using reacquisition prices - this has been changed to a proper mark-to-market evaluation (which is typically lower).

If maximum LTV levels are exceeded, e.g. through a real estate price decline, the issuer has to post additional collateral in the capital centre and increase the cover pool with new assets until the required limit is reached. Otherwise, all bonds issued in the relevant series lose their designation as SDOs/SDROs.

Danish law stipulates real estate evaluation must be done using a practical mark-to-market approach. In general, properties must be valued subject to inspection by a professional valuation officer of the mortgage or commercial bank who possesses experience relevant to the property type and market type. In addition, these valuation officers have to be independent of the credit granting process.

- Residential properties must be valued at least every 3 years.
- Commercial properties must be valued at least annually.
- Mortgage value may not exceed open market value.
- Open market value may reasonably be achieved within a selling period of 6 months, regardless of whether the property has just been traded at a higher price.

Mortgage banks have to provide a minimum over-collateralization of 8% of risk-weighted assets. Commercial banks, on the other hand, *may* provide over-collateralization on a *voluntary* basis. Risk-weighted basis implies that the low risk weights lead to lower nominal minimum over-collateralization.

Under Basel I, mortgage loans have typically had a risk weight of 50%, leading to a *de facto* mandatory over-collateralization of 4%.

Under the Basel II framework, risk weights for mortgage loans can be even lower which, in turn, will lower the effective nominal over-collateralization. Under the Standardized Approach within the Basel II framework the risk weight for mortgage loans is reduced to 35% from 50%. This means a *de facto* mandatory (nominal) over-collateralization of 2.8%. In-house FSA-approved models may produce different risk weights.

In case mortgage banks do not meet the over-collateralization requirement, they are obliged to inject cash into the capital centre as long as they have excess reserves available. Over-collateralization rules do not

apply to commercial banks issuing covered bonds.

Since outstanding covered bonds match the volume of mortgages in the pool (within the limits of the balance principle) over-collateral consists of non-mortgage assets (government bonds, central bank deposits, covered bonds, etc.). In fact, the amended covered bond legislation allows for inclusion of cover pool substitute assets for SDOs and SDROs up to 15% of outstanding covered bonds of each capital centre. Eligible assets must have a risk weight of 20% (50% for debt instruments maturing in less than 100 days). Substitute assets can be funded in two ways:

- Via the bank's capital base;
- By issuance of Junior Covered Bonds (senior debt) and loans.

Junior Covered Bonds (JCBs) are issued in accordance with the Danish Mortgage-Credit Loans and Mortgage-Credit Bonds Act. Holders of JCBs have a secondary secured claim on the cover assets within a capital centre or cover pool plus an unsecured claim against the issuer. Issuance may take place prior to observed demand in order to build up reserves. If the issuer breaches the balance principle or faces bankruptcy, all payments to JCB holders are deferred on a cumulative basis, and payments only resume after all covered bonds have been repaid. Given that payments to covered bond holders do not automatically accelerate, payments to JCB holders would, in such a case, be deferred by a considerable amount of time (as longest maturities of outstanding covered bonds typically are in the range of 30 years).

In addition to the risk of deferred payment, JCB holders also have to absorb any potential loss incurred if at the time of issuer default the 8% over-collateralization is not sufficient to absorb losses in the cover pool. Assuming that asset quality within the cover pool is superior to other assets on the balance sheet of the issuer, JCB holders should in this regard be in a better position than senior unsecured creditors on the issuer, although the long deferral in payments could lead to deterioration in asset quality. The main difference between JCB and covered bonds is the absence of a first ranking preferential claim on a segregated pool of assets and the payment disruption in the case of issuer insolvency. JCB do not fulfil criteria set by the CRD and are 20% risk weighted in Denmark, nor do they fulfil the criteria in UCITS 22(4) for preferential treatment. They are eligible for repurchase transactions with the Danish central bank.

### Overview of the Danish covered bond market

The Danish covered bond market is dominated by bonds issued by mortgage banks and with a pass-through structure. Until June 2007 only specialized mortgage banks were allowed to issue mortgage bonds (RO). This led to the establishment of mortgage banks by commercial banks like Danske Bank or Nordea, and a large number of smaller regional banks jointly owned the Totalkredit (now part of the Nykredit group) mortgage bank. Following the 2007 amendment of covered bond legislation, the major mortgage banks have opened covered bond programmes, whereas only few commercial banks have chosen to do the same.

EXHIBIT 7: LARGE ISSUERS IN THE DANISH COVERED BOND MARKET

<b>Issuer</b>	BRF Kredit A/S	Nordea Kredit	Nykredit Realkredit A/S	Realkredit Danmark A/S
<b>Ticker</b>	BRF	UNIKRE	NYKRE	RDKRE
<b>Issuer type</b>	Mortgage bank	Mortgage bank	Mortgage bank	Mortgage bank
<b>Issuance type</b>	All types	All types	All types	All types
<b>Currency</b>	DKK	Mainly DKK	Mainly DKK, EUR	Mainly DKK, EUR
<b>Ownership</b>	Foundation	Subsidiary of Nordea	Foundation	Subsidiary of Danske Bank
<b>Volume (DKK)</b>	206bn	282bn	913bn	643bn
<b>Ratings:</b>				
<b>Issuer</b>	Baa3	-/-/-	Aa1/AAA/-	-/-/-
<b>Mortgage bonds</b>	Aa3/-/-	Aaa/AAA/-	Aa1/AAA/-	Aaa/AAA/-
<b>Covered bonds</b>	Aa1/-/-	Aaa/AAA/-	Aaa/AAA/- Aa1/AAA/-	Aaa/AAA/-
<b>JCB</b>			Aa3/-/-	

By outstanding volume, the Danish covered bond market is the second largest after the German market. Public sector covered bonds like the German “Öffentliche Pfandbriefe” do not exist in Denmark. This means that in terms of (covered) mortgage bonds, Denmark is the biggest market.

The Danish covered bond market can be classified according to bond type (RO/SDO/SDRO), the balance principle and the type of collateral. These classifications will vary by issuer and capital centre. From an investor point of view, however, it is also necessary to distinguish bonds by coupon type and redemption features. In particular, prepayments are common in the Danish market as well as early redemption (active loan management). Therefore, issuers have adopted callable and sinkable bonds to a large extent due to the old balance principle, which required matching of assets and liabilities, and whereby redemption and amortization features granted to borrowers were passed through to investors.

EXHIBIT 8: SMALLER ISSUERS IN THE DANISH COVERED BOND MARKET

<b>Issuer</b>	Danske Bank A/S	DLR Kredit A/S	LR Kredit A/S	Danish Ship Finance
<b>Ticker</b>	DANBNK	LANDBR	LNDSBK, LDKRED	DANSKB
<b>Issuer type</b>	Commercial bank	Mortgage bank	Mortgage bank	Commercial bank
<b>Issuance type</b>	EUR-style covered bonds	All types	Mortgage bonds	All types
<b>Currency</b>	DKK, EUR	DKK, EUR	DKK	DKK

Ownership	Public company	Private limited company owned by Danish regional banks	Private limited company owned by several Danish banks. Specialized lending activity	Private limited company owned by several Danish banks, shipping companies, shipyards etc. and the Danish Central Bank
Volume (DKK)	112bn	95bn	11bn	54bn
Ratings:				
Issuer	Aa3/A/A+	A3/-/-	-/-/-	A2/-/-
Mortgage bonds		Aa1/-/-	-/-/-	A2/-/-
Covered bonds	Aaa/AAA/AAA	Aa1/-/-		

In terms of bond types, the market has historically been composed entirely of callable bonds used for financing mortgage loans with annuity structure. In 1996, non-callable bullet bonds were introduced for financing long-dated amortizing mortgage loans with shorter-dated bonds, i.e. creating adjustable-rate mortgage (ARM) loans. ARM loans - and bonds - soon became a success.

**EXHIBIT 9: FIXED-RATE COVERED BONDS IN THE DANISH MARKET**

<b>Bond type</b>	Fixed-rate bullets	Fixed-rate callables
<b>Structure</b>	Non-callable bullet bonds	Callable annuity bonds
<b>Maturities</b>	1-11 years	10, 15, 20 and 30 years
<b>Interest-only Option?</b>	No (bullet loans)	Yes
<b>Currency</b>	DKK & EUR	DKK
<b>Purpose</b>	Funding of adjustable-rate annuity loans	Funding of fixed-rate callable annuity loans
<b>Issuance activity</b>	Until maturity	Open 3 years (when price below par)
<b>Remark</b>		Prepayment risk

The size of the non-callable covered bond market has grown since inception and is now of the same magnitude as the callable covered bond market. The relationship between these two markets varies somewhat over time, in accordance with prepayment activity and shape of the interest rate term structure. A steep term structure typically entices borrowers to use ARM loans as first-year total loan payments are considerably lower than on fixed-rate callable loans.

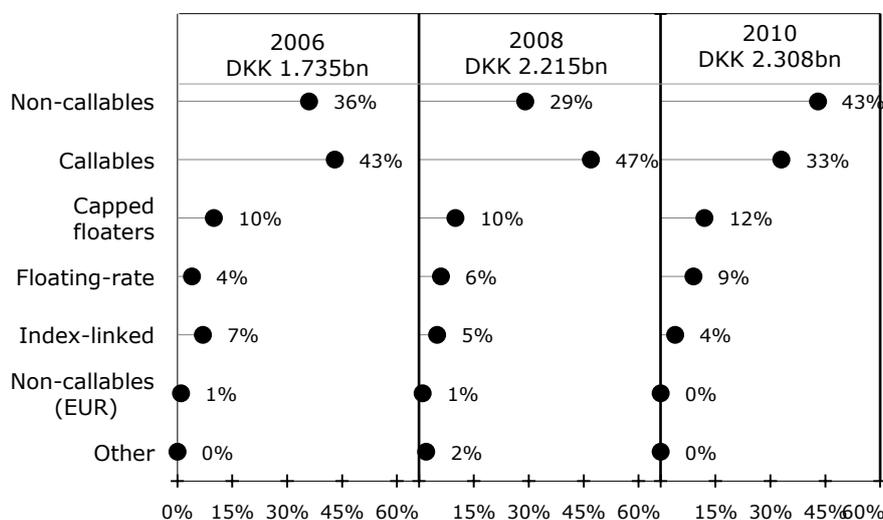
In response to fears by ARM borrowers over rising short-term interest rates, floating-rate loans with interest rate caps were introduced in 2001. Also, pure floating rate loans linked to money market rates have been introduced. The latter are mainly used for non-private mortgage loans, where borrowers combine loans with financial instruments (interest rate

swaps, caps and floors) linked to the same money market rates. For private borrowers, Danish taxation rules make it inefficient to operate with interest rate caps separate from loan financing and hence this explains the need for variable-rate loans with an embedded interest rate-guarantee.

EXHIBIT 10: FLOATING-RATE COVERED BONDS IN THE DANISH MARKET

FLOATING-RATE COVERED BONDS			
Bond type	Floating-rate bullets	Capped floaters	One-way floaters
Structure	Floating rate bullet bonds	Capped floating-rate annuity bonds	Capped floating-rate annuity bonds
Coupon	3M or 6M CIBOR plus spread	6M CIBOR plus spread, with cap	10Y CMS plus spread, with ratchet cap
Maturities	5, 10 and 30 years	5, 10, 20 and 30 year	10 and 30 year
Interest-only Option?	No (bullet loans)	Interest-only option	Interest-only option
Currency	DKK (mainly) & EUR	DKK (mainly) & EUR	DKK
Purpose	Funding of floating-rate annuity loans	Funding of floating-rate capped annuity loans	Funding of floating-rate capped annuity loans
Issuance	Until maturity	Open 3 years	Open 3 years
Remark	Some series callable @ par	Some series callable @ 105	Callable @ par/105 Cap reset every fixing to current coupon

EXHIBIT 11: COMPOSITION OF THE DANISH MORTGAGE MARKET



Data Source: Nykredit, Sparinvest

In the past, Danish mortgage banks have issued index-linked mortgage bonds. Issuance of such bonds commenced in 1982 in an era of high inflation rates and was - from the outset - targeted towards certain borrower segments (partially in response to unfavourable tax deduction rules). Issuance of index-linked mortgage bonds ceased in 2002 and is unlikely to reopen. However, due to the long maturity and indexation of

principal amounts, the outstanding amount of such bonds is only decreasing slowly.

In spite of the large size of the Danish bond market, the effective number of distinct outstanding bonds is manageable. Danish issuers have had an unstated agreement to issue bonds with identical coupon(s) and maturities.

By virtue of the Balance principle, Danish issuers have to match mortgage loans and funding, and thus issuance is typically done as tap sale instead of the large syndicated jumbo issues seen in the European covered bond market. Hence Danish covered bond series can be built up over time and reach sizeable circulating amounts. For the three largest issuers (Nykredit, Realkredit Danmark and Nordea Kredit) new issues in covered and covered mortgage bonds of same type, coupon and maturity tend to trade at same price levels.

EXHIBIT 12 shows the 20 largest Danish bond series (excluding government bonds) as of May 2010 in billions DKK aggregated across issuers. Together these 20 bond series account for around 30% of the Danish covered bond market.

**EXHIBIT 12: THE 20 LARGEST DANISH BOND SERIES (>1 YEAR TO MATURITY)**

Bond series	Bond type	Outstanding (bn. DKK)
2% 2013 (Jan.)	Non-callable	69,9
4% 2035	Callable	69,7
5% 2038 IO	Callable	63,9
5% 2035	Callable	59,6
5% 2038	Callable	54,2
4% 2012 (Jan.)	Non-callable	44,7
5% CF 2038 IO	Capped floater	41,7
5% 2041	Callable	28,9
5% CF 2038	Capped floater	28,4
4% 2038	Callable	28,0
4% 2038 IO	Callable	27,0
5% 2041 IO	Callable	24,8
5% CF 2016 IO	Capped floater	24,0
4% 2012 (Oct.)	Non-callable	22,9
4% 2014 (Jan.)	Non-callable	22,4
2% 2015 (Jan.)	Non-callable	21,5
4% 2025	Callable	18,6
4% 2013 (Jan.)	Non-callable	18,1
4% 2012 (Jan.)	Non-callable	16,5

The market for Danish non-callable covered bonds resembles other

European covered bond markets. These bonds are used for funding of adjustable-rate loans. As bonds have shorter maturities than the underlying loans, refinancing takes place at regular intervals. Among Danish ARM borrowers, yearly refinancing is the most common choice and typically accounts for more than 75% of all refinancing activity. Product development among issuers means that borrowers can choose from a multitude of refinancing options, e.g. triennial refinancing, yearly refinancing of one-third of the loan, repayments that increase with lower refinancing rates (albeit no slower than a 30-year annuity), etc. All of these loan types are refinanced using a set of standardized bond types with maturities between 1 and 10 years, and such that borrower refinancing rates directly correspond to market prices (rates) on the covered bonds.

Until recently, all of these bonds had maturity dates January 1<sup>st</sup> and were issued in the primary market each year in December on auctions held by mortgage issuers (i.e. determining the refinancing rate for existing borrowers), and issued in the secondary market the rest of the year (i.e. determining the rate for new borrowers until the next refinancing date). The size of these auctions has grown to reach almost DKK 500bn in December 2009 and, in order to reduce size and market impact spread, new maturities of April 1<sup>st</sup> and October 1<sup>st</sup> have been introduced to spread issuance more evenly over the calendar year.

As of June 2010, total outstanding amount of mortgage, covered and covered mortgage bonds maturing within one year is DKK 608bn and €20.5bn. Among these bonds approximately DKK 475bn and €18.5bn matures on January 1<sup>st</sup> 2011.

The market for long-dated Danish covered bonds is dominated by callable bonds. The bonds are sinkable, i.e. they have an annuity-like profile. The majority of issuance is in 30-year bonds (with and without a 10-year interest only option), to a smaller extent in 20-year bonds, whereas 10-year and 15-year callable bonds are issued much more rarely. The call feature is a consequence of the right of borrowers to prepay the loan at par. Consequently, callable bond series are open for issuance only if the price is below par. Covered bond issuers may thus need to open a new bond series with lower coupon if the current on-the-run callable bond crosses par. Danish covered bond issuers have had a tacit agreement only to issue callable bonds with integer coupon rates on the grounds that markets otherwise will become too heterogeneous. Moreover, issuance usually takes place over a three-year period in order to build up larger bond series.

The callable bond market can be divided according to issuance period and original maturity as older bond series tend to get “seasoned” as a result of prepayment activity. For a callable bond, upside potential is limited in a declining interest rate environment due to prepayments. As a result, investors are compensated by higher premiums compared to non-callable bonds. Furthermore, investors need to estimate how prepayment risk affects the future pricing of such bonds. A measure that can be used to compare bonds is the option-adjusted spread (OAS). It reflects the yield pick-up or compensation (relative to a benchmark curve) taking into account embedded options. Prepayment activity largely depends on interest rate levels, but other factors must also be taken into account:

- Prepayment costs;
- Refinancing alternatives;
- Loan size distribution (large loans tend to be prepaid faster);
- Ratio of residential to commercial mortgage loans;
- Tax status of mortgage loans (private borrowers are exempt from tax on capital gains in case of prepayments; whereas corporate borrowers are tax liable, therefore less prone to prepay);
- Pool factor and burn-out (first prepayments are done by fast movers; remaining borrowers are slower to react);
- Steepness of term structure (low short-term rates make ARMs more attractive when looking at first-year loan payments).

Moreover, some of these factors will change over time depending on future prepayment activity. Pricing models for such bonds must be based on a complete, stochastic interest rate term structure model, fitted to implicit interest rate volatilities and calibrated to historical and/or implied prepayment rates, using parameters corresponding to these factors. The modelling of these bonds is similar to what is seen in the US market for callable mortgage-backed securities.

**EXHIBIT 13 VINTAGES OF DANISH CALLABLE BONDS**

Vintage	2008-	2005-08	2002-05	1999-2002	1996-99	1993-96
<b>30-year</b>				8% 2032	8% 2029	8% 2026
	7% 2041(10)			7% 2032	7% 2029	7% 2026
	6% 2041(10)	6% 2038(10)	6% 2035	6% 2032	6% 2029	<b>6% 2026</b>
	<b>5% 2041(10)</b>	<b>5% 2038(10)</b>	5% 2035(10)	<b>5% 2032</b>	<b>5% 2029</b>	
	4% 2041(10)	4% 2038(10)	<b>4% 2035(10)</b>			
	3% 2041	3% 2038				
<b>20-year</b>	7% 2031			7% 2022	7% 2019	<b>7% 2016</b>
	6% 2031		6% 2025	6% 2022	6% 2019	6% 2016
	<b>5% 2031</b>	5% 2028	5% 2025	<b>5% 2022</b>	<b>5% 2019</b>	
	<b>4% 2031</b>	<b>4% 2028</b>	4% 2025			
		3% 2028	<b>3% 2025</b>			
<b>15-year</b>				6% 2017	6% 2014	6% 2011
	5% 2026			5% 2017	<b>5% 2014</b>	
	<b>4% 2026</b>	<b>4% 2023</b>	<b>4% 2020</b>			
	3% 2026	3% 2023	3% 2020			
<b>10-year</b>		3% 2018	3% 2015	5% 2012		
	4% 2021	4% 2018	<b>4% 2015</b>	4% 2012		
			3% 2015			

Note: Largest bond series in each group marked in bold

A particular feature of Danish mortgage loans, compared with the US market, is that borrowers always have the opportunity to buy back their

loan by delivering the nominal amount of bonds used for financing the loan. (In practice, borrowers may instruct the issuer to buy back the bonds in the market at prevailing prices). This may occur when property owners sell their property prior to loan maturity (relocations, divorces, deaths etc.), but may also happen on a larger scale when interest rates have risen considerably.

The logic is as follows: buy back the original loan considerably below par, i.e. at a considerably lower market value than the nominal value. Take out a new loan close to par, either a fixed-rate callable loan with a somewhat higher coupon, or an ARM loan. When (if) interest rates fall again, buy back this loan and take out a new fixed-rate callable loan with the same coupon as the original. In this way the loan size has been decreased whilst maintaining the coupon rate. In terms of profitability, the manoeuvre requires interest rates to fall back to original levels (as when the original loan was taken out) because the upward prepayment requires the borrower to pay higher interest rates over a period of unknown length. As such, the operation is not risk-free. The covered bond market has, however, occasionally been hit by 'tempests' resulting in the transitory suppression of bond prices and quickly followed by reversals (US rate hikes in 1994, unwinding of LTCM' collapse in 1998, financial crisis in 2008). From an investor viewpoint, the delivery option creates interesting opportunities as issuers have to find bonds in the market that may be held in the hands of only few investors.

Callables with deep in-the-money options are bonds that trade significantly above par. The outstanding amount of these bonds is small due to a large amount of prepayments. The remaining volume is usually not affected by high prepayments and cover pools are dominated by small loans. Advanced prepayment models typically do a poor job at predicting behaviour of the remaining irrational borrowers. Deep in-the-money callables have interest rate sensitivity close to zero and are traded at money market levels with low liquidity.

Callables with at-the-money options trade close to par. The risk of prepayments is high if rates decline further, limiting the upside potential. These bonds feature a high negative convexity, leading to a high risk premium for investors. In case of rising interest rates, the investor faces *extension risk*, as the likelihood of prepayments diminishes and loans are prepaid at a slower rate. Interest rate 'swaptions' can be used to manage volatility risk and negative convexity. In practice, other factors may enter the picture and create a less-than-perfect hedge. Depending on loan seasoning, borrowers may wish to exercise the delivery option and these bonds may potentially trade with low interest-rate sensitivity. Above par prepayments dominate and limit upside potential, and below par buybacks dominate and limit downside risk. At-the-money callables require careful risk management.

Callable bonds trading significantly below par have an out-of-the-money option where only large changes in interest rates affect prepayment behaviour of borrowers. Out-of-the-money callables are easiest compared with non-callable bonds.

### More information

The Association of Danish Mortgage Banks has a [website](#) with publications on the Danish mortgage system as well as statistics updated with regular intervals.

Mortgage issuers maintain extensive websites with information pertaining to mortgage lending activity, bond prospectuses, information on cover pool composition, current prepayment activity etc.

The main brokers in the Danish covered bond market publish regularly-updated publications highlighting structural changes and containing current viewpoints on market outlook - see e.g. [Nykredit's Danish Covered bonds publication](#).

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