

Author



Allan W. Larsen

Senior Vice President, Head of FX and Mortgage
Bonds

Allan joined Jyske Bank in 2012 and has 26 years of
experience in the financial markets.

Introduction to the Danish Mortgage Bond Market



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Introduction

The Danish Mortgage Bond Market is one of the oldest and most stable in the world, tracing its roots all the way back to 1797 with no records of defaults since inception. Furthermore the market value of the Danish Mortgage Bond Market is app. EUR 391bn, making it the largest mortgage bond market in Europe.

The Danish Mortgage Bond Market is a unique blend of size, stability, transparency and liquidity, making it viable investment opportunity as explained further by the following points:

- Attractive yields compared to EUR govt and other EUR covered bond
- Largest market in Europe and one of the largest markets in the world with a value of app. EUR 391bn
- Has not experienced a single default since inception in 1797
- Resistant to crises: Issued same amount of bonds at the peak of the economic crisis in the last quarter of 2008 as in the same period in 2007. In the remaining Euro-area, the amount of bonds issued in the last quarter of 2008 was only 2% of the amount issued in 2007
- Unique match-funding principle where there is an exact match of the loan given and underlying bond issued, securing financial stability
- Above AA- credit rating, but most of it AAA rating
- Transparent and standardized market
- Very liquid - Perceived to be only slightly less liquid than government bonds by the European Banking Association

Origin & historical stability

The need for mortgage lending emerged in Denmark in 1795 after the Great Fire of Copenhagen. A quarter of the city was lost in the fire, creating a demand for new buildings over a short period of time, and thereby also creating a great demand for financing through an organized credit market. In 1797 Denmark's first mortgage association was established by a number of wealthy individuals, which granted loans based on the issuance of bonds. Since then the Danish mortgage model has gone through several legislative changes, but the main objective is still to provide stable and affordable mortgage financing.

The objective of stability is also seen in the Danish Mortgage Bond Markets resistance to economic crises, as the Danish economy has gone through several crises in the past 40 years:

- The two oil crises of the 1970's
- The 1986 austerity package and the 1987 tax reform
- The Dot-Com bubble in 2000
- The Financial Crisis in 2008

Each crisis has affected the mortgage system in different ways, and even caused heavy losses for the Danish Mortgage Banks. However the losses have never affected investors, as not one Danish Mortgage bondholder has lost the investment. Furthermore the market has stayed active and liquid under crisis, as evidenced by Dick-Nielsen et al. (2012) who find that the Danish Mortgage Bonds were as liquid as the Danish government bonds during 2008-2009.

The Danish Mortgage Market

In the following the basics and unique features of the Danish covered bond market will be explained, to give an inside on the investment possibilities.

4 types of mortgage bonds

The Danish mortgage bond market mainly consists of the following 4 types of mortgage bonds:

- ARMs – Adjustable Rate Mortgage Securities, which are subject to refinancing until the longer-term underlying loan has matured. The maturities match the fixed-rate period of the underlying loans, and are mainly 1 to 5 years and the bonds are bullet
- Floating-rate note – Variable-rate annuities with redemptions matching the underlying loans. The maturities are mainly from 1 to 5 years
- Capped floater – Variable rate annuities with redemptions matching the underlying loans. The maturities are mainly from 5 to 30 years
- Callable bonds – Fixed-rate callable annuities, where payments and redemptions match the underlying loan. The maturities are mainly 15, 20 or 30 years

All 4 types of mortgage bonds have underlying loans where maturities of up to 30 years are available. Furthermore most loans can be offered with an interest-only (IO) period of up to 10 years. If the IO option is chosen, the loan must be repaid as an annuity profile over the remaining lifetime of the loan (min. 20 years). At the moment the amount of loans with an interest-only period is declining, and currently 52,7% of the loans to Danish house-holds have an interest-only option.

The Danish mortgage model

The Danish mortgage model is based upon a very stable and transparent system, with several advantages and unique features.

Advantages of the Danish mortgage model:

- The mortgage banks do not function as commercial banks, and can only fund loans

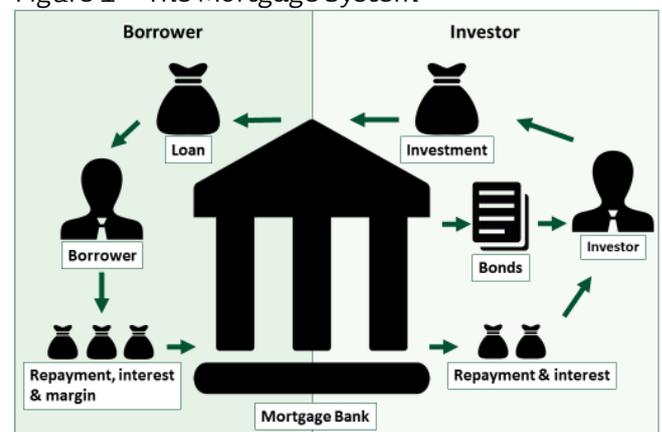
through the sale of bonds which limits the risk of the mortgage banks

- The mortgage bank protects the investor from the borrower defaulting (Credit Risk)
- Market risk is fully transferred to either the investors or borrowers
- Issued bonds are secured by the mortgage issuer, and by mortgage loans and other collateral in the cover pool
- Mortgage banks must ensure that the cover pool complies with loan-to-value (LTV) limits on a continuous basis and supply additional collateral if house prices are falling
- Mortgage banks must observe the rules of the Danish Financial Supervisory Authority when assessing the value of a property
- Strict LTV requirements since mortgage banks are responsible for managing their exposure to credit risk, this creates incentives for lenders to ensure good underlying credit quality
- Danish home owners pay an interest rate determined by the market, as opposed to the bank
- The system provides a high degree of transparency and standardization, and keeps transaction costs low

Match funding principle

As already mentioned one of the unique features of the Danish Mortgage model is the match-funding principle illustrated in figure 1.

Figure 1 – The Mortgage System



Source: Jyske Capital

The match-funding principle entails that for every loan made by the mortgage bank, a new bond is issued with matching cashflow properties. This eliminates mismatches in cashflows and refinancing risk for the mortgage bank, which also secures payment for the bondholder. In the Danish mortgage system the mortgage bank functions as an intermediary between the investor and borrower. Mortgage banks fund loans on a current basis, meaning that the bond must be sold before the loan can be given. This also entails that the market price of the bond determines the loan rate. The loan is therefore equal to the investment, which passes through the mortgage bank. Repayment and interest from the borrower to investor also passes through the mortgage bank, however the mortgage bank charges the borrower a margin throughout the lifetime of the loan, which is a percentage of the debt outstanding. Since the mortgage bank is only an intermediary it is not affected by changes in the floating rate, as it passes repayments and interest through to the investor. The drawback for the mortgage bank is that it endures the credit risk in the event of a default of the borrower, as it still has to make repayment and interest to the bondholder. This however protects the investor as the credit risk is removed, but is also a great incentive for the mortgage bank to put an emphasis on the due diligence process when issuing loans and adds to the stability of the system. Part of the due diligence is not only valuing the property when making a credit assessment of a potential borrower, but also assessing the borrower's current economic situation including current income and wealth.

The activities in which mortgage banks are allowed to participate are by law limited to mortgage lending by issuance and sales of mortgage bonds (The Specialist Bank Principle). Legislation also dictates eligibility criteria for granting and funding loans. The specialist bank principle secures transparency and standardization in the Danish mortgage bond market.

Delivery and prepayment

Another unique feature of the Danish mortgage model is the delivery option which means that the

borrower always has the possibility of buying the underlying bond in the market, and deliver it back to the mortgage bank, who then cancels the loan. This is a unique way for the borrower to reduce the notional amount of his loan if interest rates rise, and the related bond price falls. It also has a hedging effect on the expected drop in house prices that follows increasing interest rates as the two effects offset each other. This has no effect on the investor as the bond will be traded at market prices.

Callable bonds also have a prepayment option (Embedded call-option). The prepayment option gives the borrower the opportunity to prepay the loan at par (100) at any given time.

Capped floater have a similar prepayment option, however the price depends on the contract and is typically 105. This is favourable when the current available coupon rate is below the coupon rate on the mortgage.

The prepayment option on Danish callable and capped floater bonds are more difficult to price than corresponding bonds without the prepayment option and come with an additional prepayment risk for the investor, this is however rewarded with a higher price and resulting interest rate. The prepayment risk is further explained in the risk section.

Regulatory viewpoint

As mentioned previously Danish Mortgage bonds are viewed upon favourably by regulatory institutions, especially in regards to capital requirements.

Capital Requirement Directive

1st of July, 2007 a new Danish covered bond legislation came into effect. The legislation was created to implement the Capital Requirements Directive (CRD) from EU, into Danish law and make Danish mortgage bonds comply with the covered bond definition. As traditional Danish mortgage bonds did not comply with CRD an introduction of new covered bond types was necessary, giving Mortgage banks 3 types of bonds to fund their loans:

- Traditional mortgage bonds (Realkredit Obligationer - RO)
- Covered mortgage bonds (Særligt Dækkede Realkredit Obligationer - SDRO)
- Covered bonds (Særligt Dækkede Obligationer - SDO)

	RO	SDO/SDRO
Collateral Assets	Real Estate	Real Estate, Public Loans, Derivatives and substitution assets
LTV compliancy required	At the time of granting loan	Continuously

Source: Jyske Capital

The SDRO and SDO were the two new bond types introduced as CRD-compliant, whereas the RO is not CRD-compliant. Mortgage banks can issue all 3 types of bonds but commercial banks may only issue covered bonds. In practice there are no essential differences between the two types of covered bonds, as both types of covered bonds must comply with a number of requirements that do not apply to traditional mortgage bonds.

Furthermore the legislation enabled mortgage banks to abandon the match-funding principle, and separate loans from bonds. However the Danish mortgage banks have decided to uphold the match-funding principle, giving further credit to the efficiency and positive effects of the Danish mortgage credit system.

Covered bonds compared to traditional mortgage bonds

From an investor viewpoint there are two significant differences between Traditional mortgage bonds and the covered bonds:

- For traditional mortgage bonds the LTV limits are only a requirements at the time the loan granted. However for covered bond and covered mortgage bonds, the bonds must

comply with the LTV limits continuously, and the banks must provide supplementary security if the LTV limits are exceeded.

- Both types of covered bonds are subject to more lenient capital requirements for investors, than traditional mortgage bonds. Investors are therefore willing to pay a higher price for covered bonds, and mortgage banks have mainly issued covered bonds since the inception of the new legislation.

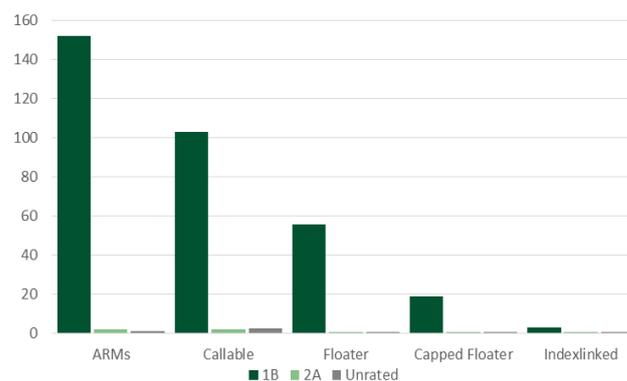
CRR/CRD IV (LCR)

Under the implemented CRD IV legislation most of Danish mortgage bonds have been classified as liquid as Government bonds, as 92,9% of Danish mortgage bonds are rated level 1B, as of January 2016. As Danish mortgage bonds live up to the CRD regulations, differences in ratings are mainly due to differences in volume outstanding as:

- Level 1B must have an outstanding volume of at least EUR 500m
- Level 2A must have an outstanding volume of at least EUR 250m

The total outstanding volume of products and their LCR-classification can be seen in figure 2.

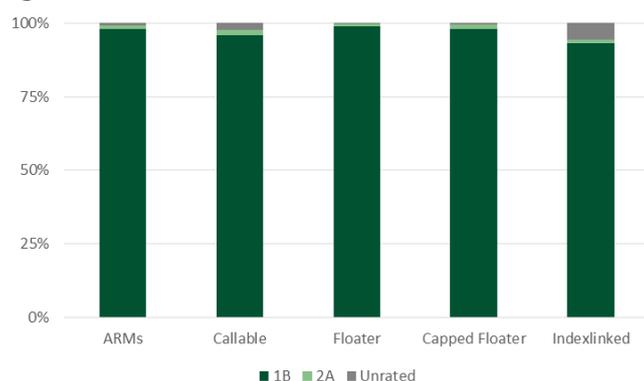
Figure 2 – Total Outstanding volume by LCR Classification (EURbn)



Source: Jyske Capital

The distribution of the ratings across product types can be seen in figure 3 below. Here it can be seen that most bonds in the Danish market are rated 1A or 2B.

Figure 3 – Share of Level 1B and Level 2A



Source: Jyske Capital

Since Danish mortgage bonds comply with the covered bond definition and have high ratings, they are treated favourably in the Solvency Capital Requirements (SCR) framework introduced with Solvency 2.

Risks

As explained the Danish Mortgage Market has very low risk for the individual, as the system is designed to share risk between the all participants. This section will however explain in more detail how an investor is protected in the Danish market.

Credit risk

Historically there has never been a single case of a Danish Mortgage bondholder losing the investment, as the Mortgage banks protects the bondholder from credit risk as a result of loan defaults. The investor is also protected from credit risk arising from the bankruptcy of a Mortgage bank as legislation favours bondholders, and specifies detailed guidelines in case of bankruptcy.

Furthermore legislation also put an emphasis on due diligence process and the LTV limits (max 80%), limits how exposed Mortgage banks can to credit risk. The system itself is also very stable as there are public authority guarantees (in the form of subsidised non-profit housing), bank guarantees on loans provided by other banks and personal recourse on defaulted debt. The borrower is thus liable for debt even after defaulting and the seizure of the property, theoretically the mortgage bank can proceed collection indefinitely.

Refinancing risk – Maturity Extension

On January 1st 2015 new legislation was introduced to reduce refinancing risk for variable-rate loans financed by several bonds with a lower time to maturity than the underlying loan (ARMs). The refinancing risk in this type of loan has previously had little effect on the investor, as failed auctions and shifts in interest rate only affected the mortgage bank and the borrower. Furthermore the investor is well-protected from the credit-risk associated with the mismatch in cash-flow from these types of events.

However the new legislation also has some effect on the investor, as the law introduces a maturity extension that can be triggered by 2 types of events:

Interest-rate trigger – If, at the time of a refinancing auction, the yield level has increased by more than 5% in the previous one-year period and the underlying bond has a maturity of up to 24 months, the maturity of the bond will be extended by 1 year. In case of an extension the yield level on the underlying bond will be equal to the yield on a corresponding bond traded 11-14 months earlier plus 5%.

Failed auction trigger – In the case of failed refinancing auctions, where a mortgage bank is unable to sell the bonds to further finance a loan, maturity on the underlying bond is extended by 1 year, after which a refinancing auction is held. Maturity extension of 1 year by failed auction trigger is repeatable until either the loan is refinanced or the loan has matured. The yield of the extended bond depends on the remaining time to maturity of the loan:

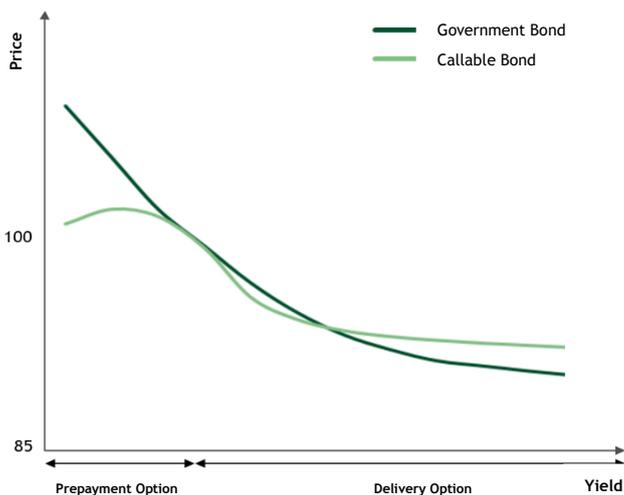
- If maturity is equal to or less than 24 months: Yield level on a corresponding bond traded 11-14 months earlier plus 5%
- If maturity is more than 24 months: Yield level on a corresponding bond with a maturity of 11-14 months traded 11-14 months earlier plus 5%

Due to the stability of the Danish mortgage system and the implemented legislation these events are very improbable and the associated risk is low, but in case of the improbable investors are secured a transparent and fair return.

Prepayment Risk

The prepayment risk arises from the option to prepay the loan at par, which exposes the investor to the risk of not being able to reinvest at the same conditions. The rational scenarios for prepayment are explained under “Delivery and Prepayment”, and bonds are priced with this risk in mind as seen in figure 5.

Figure 5 – Pricing curve of Mtg. and Gvt. Bonds



Source: Jyske Capital

When prices are close to par the price of the callable bond is lower than the price of a government bond, as the chances of prepayment increase. However the borrowers are not always rational, which can create opportunities for the active investor, but is also a source of risk for a buy-and-hold strategy.

Key risk measures

To calculate the risk of a portfolio we have a prepayment model, where we daily calculate different types of key risk measures. Though our prepayment model we calculate option adjusted duration, convexity, option adjusted risk and other risk measures.

The key risk measures is calculated on all Danish mortgage bonds, so we have the possibility to manage the different risk in a portfolio.

Size and liquidity

As mentioned previously the Danish Covered Bond Market is one of largest in the world.

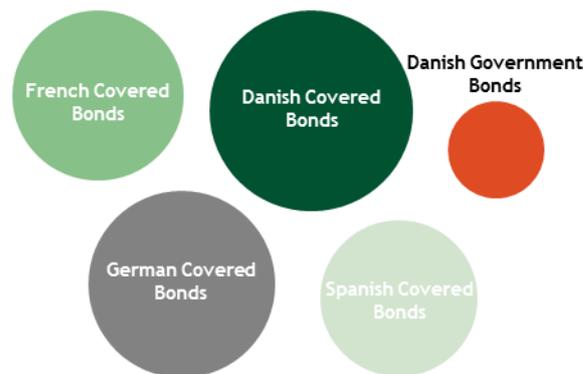
Volume Outstanding (EURbn)	
Danish Covered Bonds	391
German Covered Bonds	374
France Covered Bonds	309
Spain Covered Bonds	261
Danish Government Bonds	95

Source: 2016 ECBC European Covered Bond Fact Book

The Danish market is larger than the German, French or Spanish markets. The liquidity in the Danish covered bond market is high, and we can get narrow bid offers spread on a daily basis.

Furthermore the covered bond market is 4x larger than the Danish government bond market. Figure 6 visualises the relative size-comparison of the different markets.

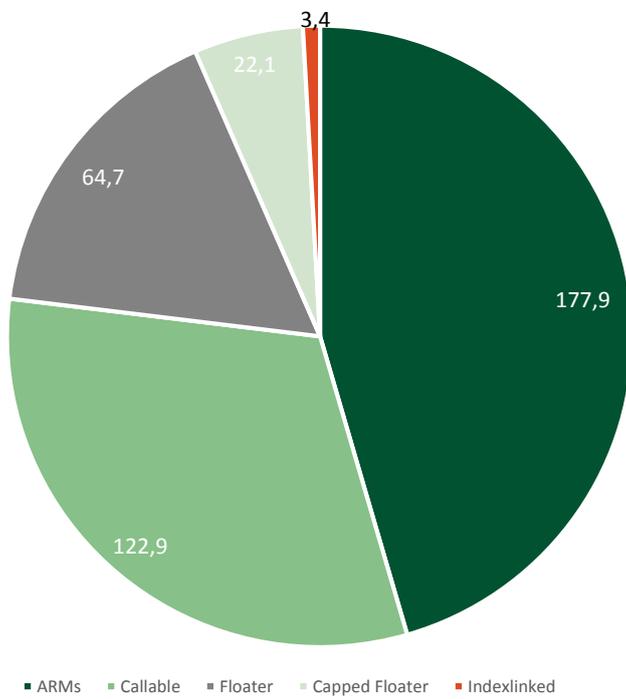
Figure 6 – Relative Size Comparison of Covered Bond Markets



Source: Jyske Capital

As can be seen in figure 7, the largest share of mortgage bonds are ARMs, which are mainly made up of short-term fixed-rate bonds. Interestingly enough even the 2nd largest product type alone is still larger than the market for Danish government bonds.

Figure 7 – Segmentation of Danish Covered Bond Market (EURbn)



Source: Jyske Capital

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