



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 1 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

Indicative Prices for Danish Mortgage Bonds

- Version 2

Introduction	2
Mortgage Market changes.....	2
Changes to FlexBonds... ..	3
The Extensions... ..	4
Some Results with the new extended model.....	5
Non-callable Danish Mortgage Bonds – FlexBonds	5
Fixed Rate callable Danish Mortgage Bonds	7
Calculation of Indicative Prices for Danish Government Bonds	12
Some Results	14
Calculation of Indicative Prices for Floating-Rate Mortgage Bonds.....	14
Which Bonds are included?	17
Some Results	17
Concluding Remarks.....	21
References	23



Document Title Indicative Prices for Danish Mortgage Bonds	Version 1.0	Page (Total) 2 (23)	
Author FinE Analytics	Approved by	Approved Version	Approval Date

Introduction

This paper's purpose is threefold. Firstly, we will address the changes in the Mortgage Market and how it influences our Indicative Pricing Model. Then we will describe a new extended version for the calculation of Indicative Prices for Danish mortgage bonds calculated on NASDAQ, originally introduced in the paper "Indicative Prices for Danish Mortgage Bonds", from 12. May 2017. Thirdly, this paper will address the extension of the universe, which now also covers, Danish Floating-Rate Mortgage Bonds and Danish Government Bonds.

For a general discussion of liquidity in the Danish Mortgage Bond Market and the associated challenges inherent in the market with respect to missing market prices and for insight into the principles of Prudent Valuation, please refer to original paper from 12. May 2017.

The paper will be organized as follows: First some of the new changes in the Mortgage Market will be discussed, and the associated influences on our Indicate Pricing model will be addressed. Secondly, we will describe and explain the reasoning behind the new "model" for Indicative Prices, that was originally introduced in the spring of 2017. Thirdly, some result for this new approach will be shown. Fourthly, we will explain how Government Bonds and Floating-Rate Mortgage bonds are treated in this new extended model, this will be followed by selected results. We will round this paper off with a short conclusion.

Mortgage Market changes

In order for a relative pricing model - as the one we have developed for the calculation of Indicative Prices - can work is that a sufficient number of Bonds are traded on a regularly basis, as these prices are used to determine the prices for the less frequent traded bonds.

In Høegh (2018) it is reported that we have seen an increasing demand for Danish Mortgage Bonds over the summer of 2018. This is due to a couple of reasons:

- There is a huge interest from Japanese investors for long maturity Mortgage Bonds
- Another reason is the relatively small supply of Mortgage Bonds. One of the things that are changing the structure of the Mortgage Market is the fact that the Government is in the process of changing the funding policy for non-residential housing from using Mortgage Bonds to use State-guaranteed bonds. This change means that there are less Mortgage Bonds for the investors, which work as an increase in liquidity

This is positive for our Indicative Pricing model for Fixed Rate Mortgage Bonds.

The new State-guaranteed bonds are issued as FlexBonds, but are priced differently (at a significantly higher price) due to the guarantee, this has some impact on the calculation of Indicative Price for FlexBonds – for details see below.



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 3 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

On the other hand, due to new regulation, there are limits to the use of Floating Rate loans (and deferred amortization), this will lower the supply of Flex-Bonds – which however does not seem to have had any significant impact on the Indicate Pricing model for Flex-Bonds.

Changes to FlexBonds...

State-guaranteed bonds are only issued by institutions which already have loans for funding of non-residential, and these are:

- Realkredit Danmark
- Nykredit
- BRF

The new State-guaranteed bonds are issued in special capital centers.

The only change the above new State-guaranteed bonds have is the following:

- As these State-guaranteed bonds are priced very close to the Government Bond Yield-Curve, they will not be included in the FlexBond estimated Yield-Curve

As per 1. October 2018, this is the list of State-guaranteed Bonds:

Isin	Name	Maturity Date	Bond First Issuing-Date	Bond Closing-Date
DK0004608429	1RD10A19APRF	20190401	20180412	20190228
DK0004608502	1RD10A20APRF	20200401	20180412	20200229
DK0004608692	1RD10A21APRF	20210401	20180412	20210228
DK0004608775	1RD10A22APRF	20220401	20180412	20220228
DK0004608858	1RD10A23APRF	20230401	20180412	20230228
DK0004608932	1RD10A24APRF	20240401	20180412	20240229
DK0004609070	1RD10A25APRF	20250401	20180412	20250228
DK0004609153	1RD10A26APRF	20260401	20180412	20260228
DK0004609237	1RD10A27APRF	20270401	20180412	20270228
DK0004609310	1RD10A28APRF	20280401	20180412	20280229
DK0004609583	1RD10A29APRF	20290401	20180412	20290228
DK0009394397	321.S.ok.18 RF	20181001	20180426	20180831
DK0009394470	321.S.ok.19 RF	20191001	20180426	20190831
DK0009394553	321.S.ok.20 RF	20201001	20180426	20200831
DK0009394637	321.S.ok.21 RF	20211001	20180426	20210831
DK0009394710	321.S.ok.22 RF	20221001	20180426	20220831
DK0009394983	321.S.ok.23 RF	20231001	20180426	20230831
DK0009395014	321.S.ok.24 RF	20241001	20180426	20240831
DK0009395287	321.S.ok.25 RF	20251001	20180426	20250831
DK0009395360	321.S.ok.26 RF	20261001	20180426	20260831
DK0009395444	321.S.ok.27 RF	20271001	20180426	20270831



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 4 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

DK0009395527	321.S.ok.28 RF	20281001	20180426	20280831
DK0009517302	1NYK13Jja19DKKRF	20190101	20180705	20181130
DK0009517492	1NYK13Jja20DKKRF	20200101	20180705	20191129
DK0009517575	1NYK13Jja21DKKRF	20210101	20180705	20201130
DK0009517658	1NYK13Jja22DKKRF	20220101	20180705	20211130
DK0009517732	1NYK13Jja23DKKRF	20230101	20180705	20221130
DK0009517815	1NYK13Jja24DKKRF	20240101	20180705	20231130
DK0009518037	1NYK13Jja25DKKRF	20250101	20180705	20241129
DK0009518110	1NYK13Jja26DKKRF	20260101	20180705	20251128
DK0009518383	1NYK13Jja27DKKRF	20270101	20180705	20261130
DK0009518466	1NYK13Jja28DKKRF	20280101	20180705	20271130
DK0009518540	1NYK13Jja29DKKRF	20290101	20180705	20281130

The Extensions...

In order for a relative pricing model, as the one we have developed for calculation of Indicative Prices can work, is that a sufficient number of Bonds are traded, as these prices are used to determine the prices for less frequent priced bonds.

One major problem with the original model, was our rule that if there is a traded price in the market at any given date, this traded price was a valid price.

As mentioned in the original paper there was no clear conclusion, when it comes to distinguish between a “valid” price jump and a “non-valid” price jump given volume, but we still feel the need to address the challenge associated with price jumps that arises from “small” trading volume. We have opted for a relatively simple solution, where the trust-region is a function of the size of the bond (outstanding amount) in question, more precisely we define the trust-region as follows:

- For volume at least equal to $\min(5.000.000, \text{Outstanding-Amount})$ the price jump associated with this volume is taken for granted
- For volume is less than $\min(1.000.000, 0.25 * \text{Outstanding-Amount})$ we will not accept the price jump
- For volumes between, we interpolate

The second issue is related to amortizing bonds (in our case Fixed Rate Callable Mortgage Bonds) and can be explained as follows:

- For all payment-dates before 1.10.2015, the publication date was around 5 weeks before the payment-date – which was also the date where for trading done after this publication date, it was done exclusive re-payment to the first coming payment-date. Since 1.10.2015, trading is done including re-payment up until the first coming payment-date, up to and including 3 bank-days before the payment-date



Document Title Indicative Prices for Danish Mortgage Bonds	Version 1.0	Page (Total) 5 (23)	
Author FinE Analytics	Approved by	Approved Version	Approval Date

- Since the payment-date 1.10.2015, this means that there will be a re-payment related price-jump from 3-bank-days (Day(-3)) to 2-bank-days (Day(-2)) before the payment-date. This means that the price change from Day(-3) to Day(-2), will consist of 2 events:
 - A price jump that is associated with the fact that the bond is traded exclusive re-payment
 - A price jump that is related to the general market movements

Previously the price jump that is associated with the fact that trading was exclusive re-payments was not taking explicitly into account, this is now embedded into the model.

This has the following consequence for Indicative Prices:

- A price jump might occur in the Indicative Prices even though there has been no trading

More precisely the non-market related price jump is calculated as follows:

$$AdjNM = \min(MP, P(New) - [P(Old) + Pct * (P(Old) - RP)])$$

Where AdjNM is the non-market related price jump. P(New) and P(Old) is respectively the clean price at Day(-2) and the Indicate Price on Day(-3), Pct is the total re-payment (this includes extraordinary and ordinaire re-payments) and RP is the redemption price. MP is the sum of all the remaining payments (coupon and re-payments).

MP is to handle the following potential problem:

- Limited liquidity combined with “large” prices and “short maturity”
 - In this category we have “high” coupon bonds

The first extension of the model for calculating Indicative Prices will affect all bonds, whereas the second only will influence Indicative Price calculations for amortizing bonds.

These 2 new extended features have been added to the model for Indicative Prices and the interesting question is, what does this entail for the results?

Some Results with the new extended model

In the following 2 sections we will look at first Non-callable Danish Mortgage Bonds – FlexBonds and then at Fixed Rate callable Danish Mortgage Bonds.

The period data is shown for is 1. July 2014 – 1. October 2018.

Non-callable Danish Mortgage Bonds – FlexBonds

For illustrating this extended model we have selected the following 2 bonds:

- 2% 2022 (DK0009288011)



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 6 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

- 1% 2026 (DK0009296543)

Figure 1:

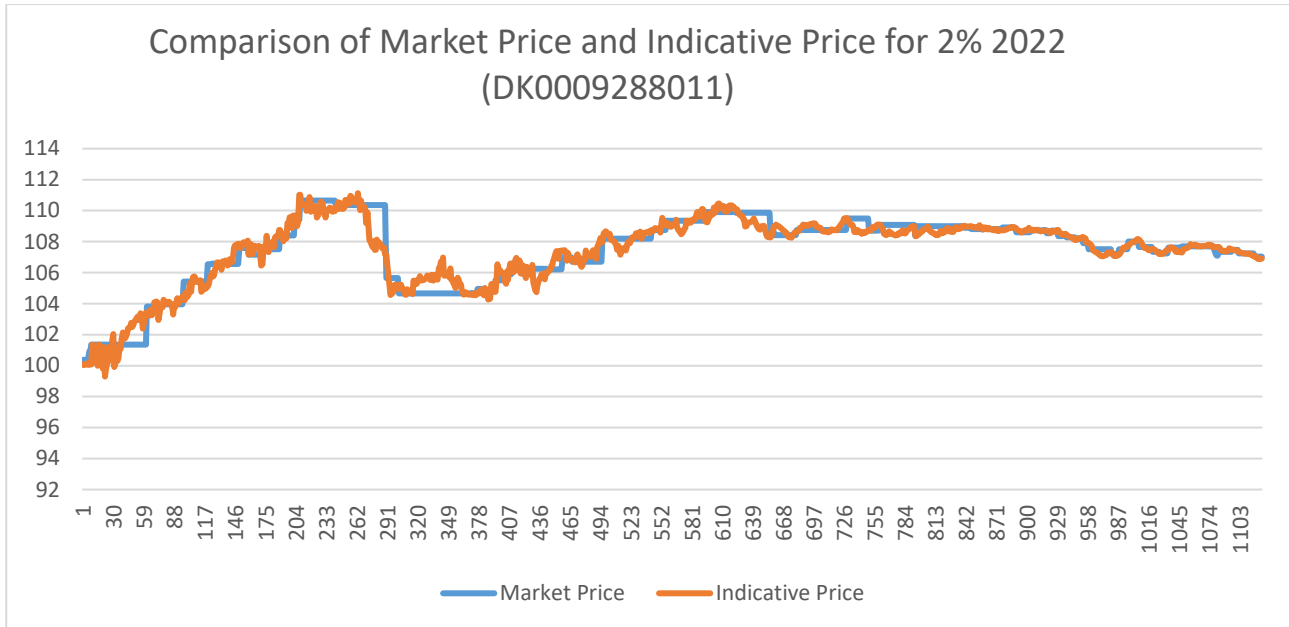
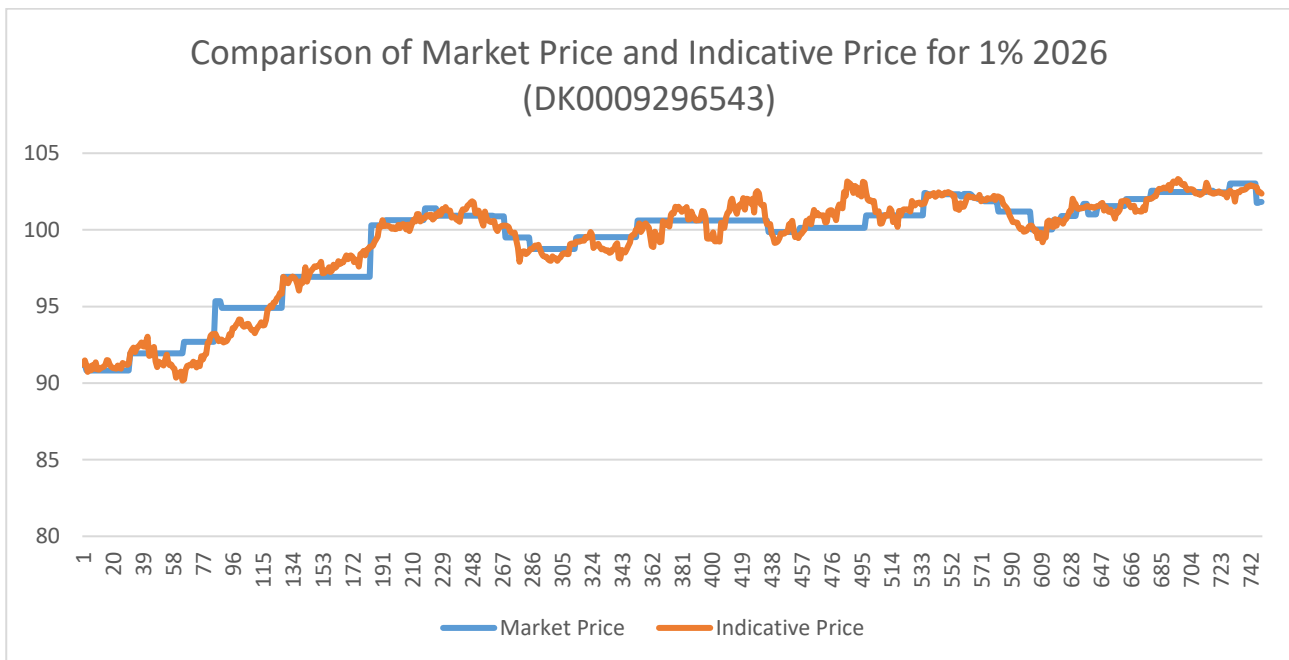


Figure 2:





Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 7 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

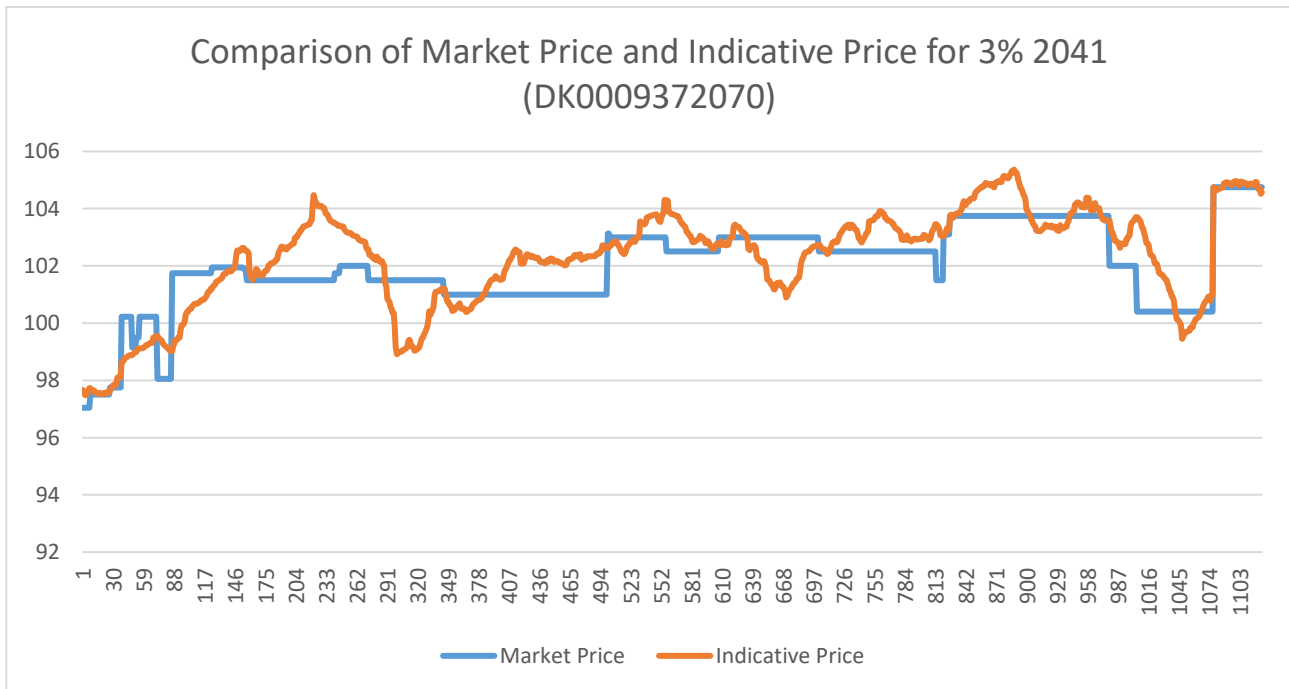
We have no comments to these charts, the Indicative Price seems to track the Market Price extremely well.

Fixed Rate callable Danish Mortgage Bonds

We have for the purpose of showing how the new extended model perform selected the following 7 bonds:

- 3% 2041 (DK0009372070)
- 4% 2035 (DK0002014729)
- 5% 2035 (DK0009753469)
- 5% 2041 (DK0009280380)
- 6% 2029 (DK0009740722)
- 7% 2039 (DK0002021930)
- 8% 2026 (DK0009343725)

Figure 3:





Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 8 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

Figure 4:

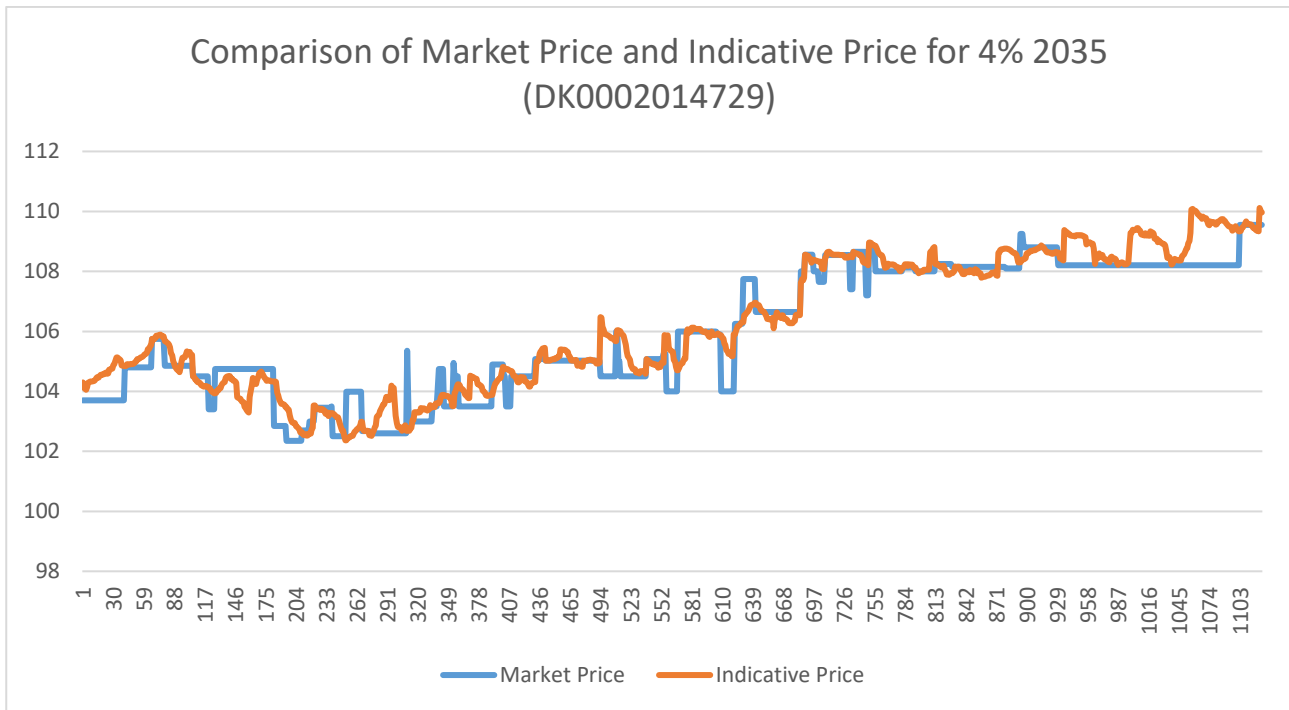


Figure 5:



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 9 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

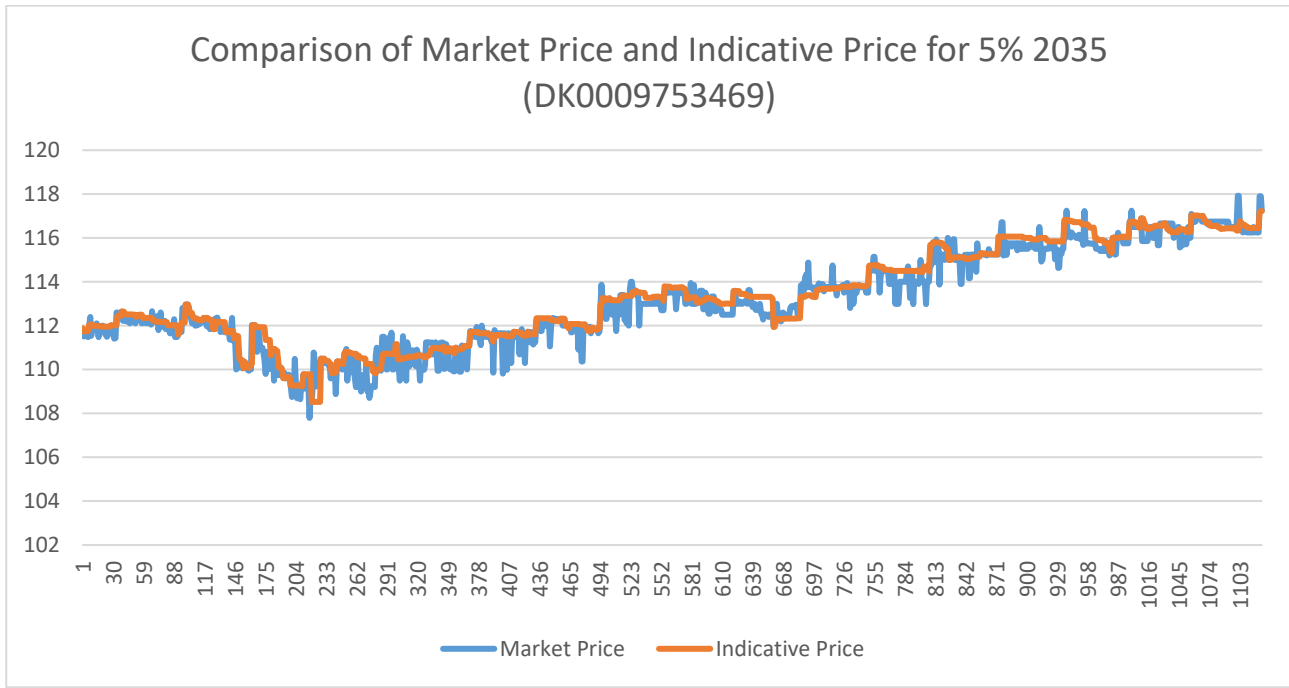


Figure 6:

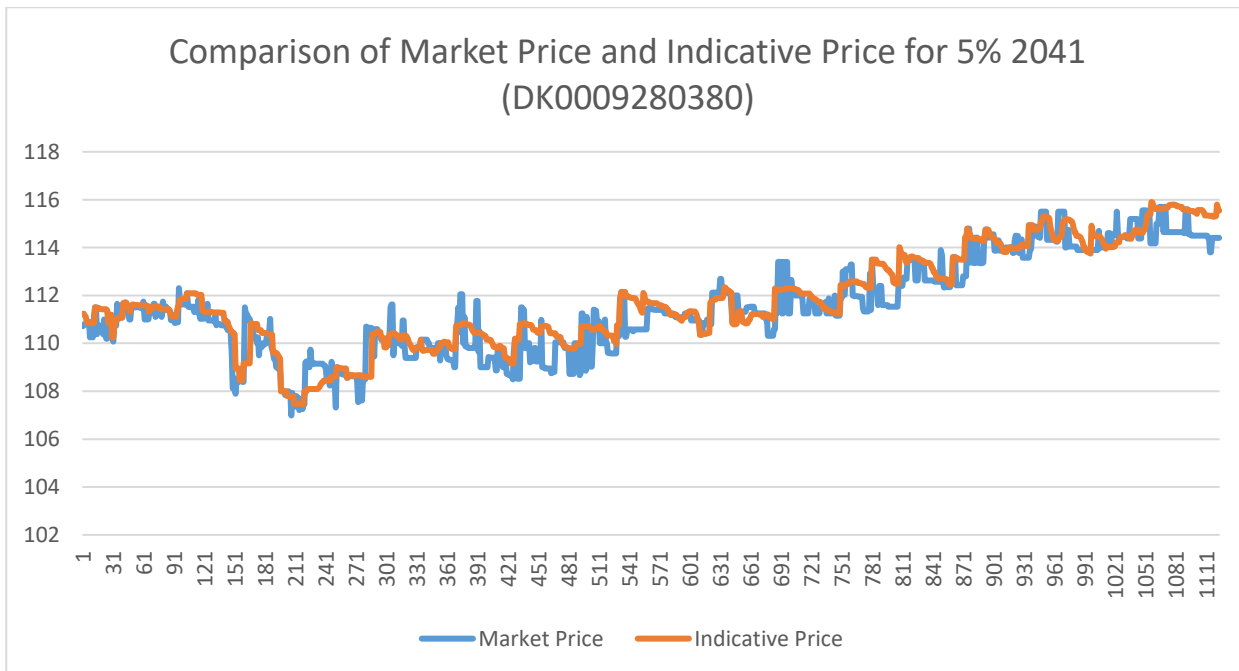


Figure 7:



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 10 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

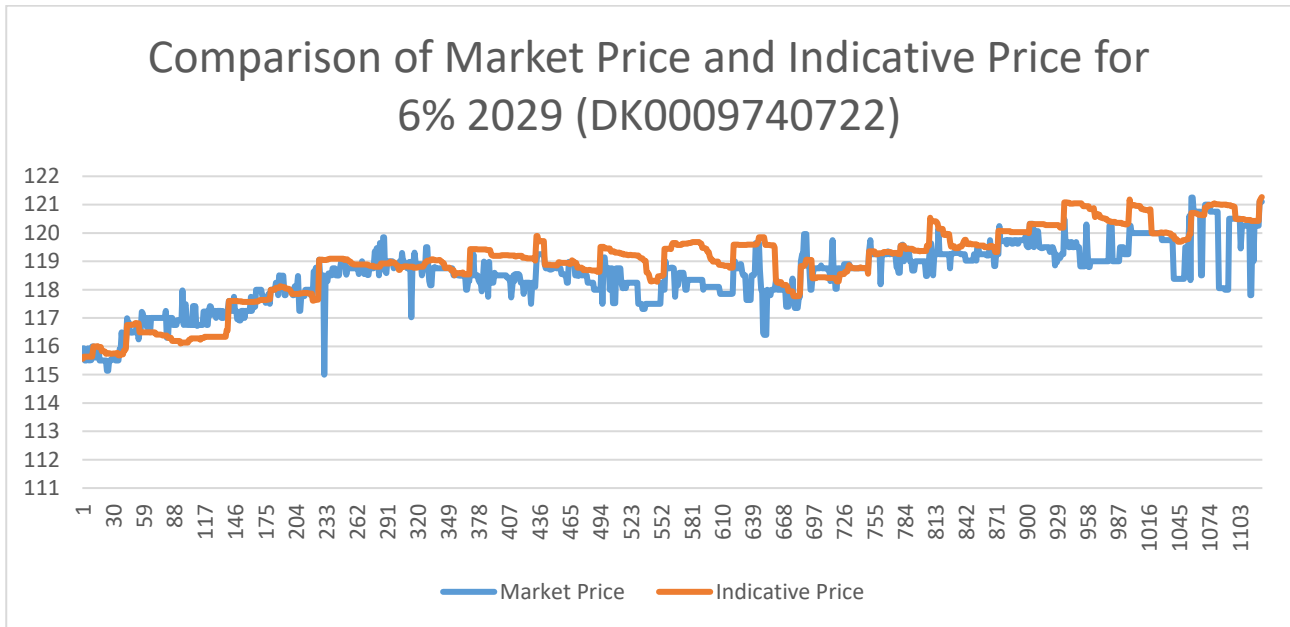
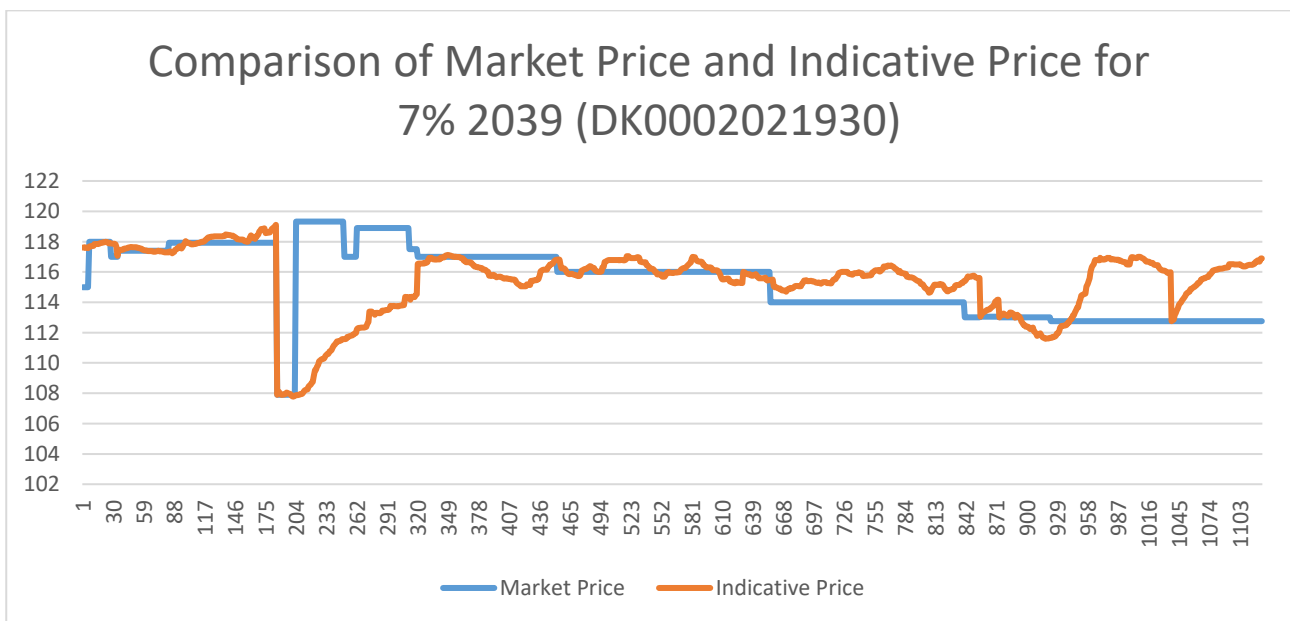
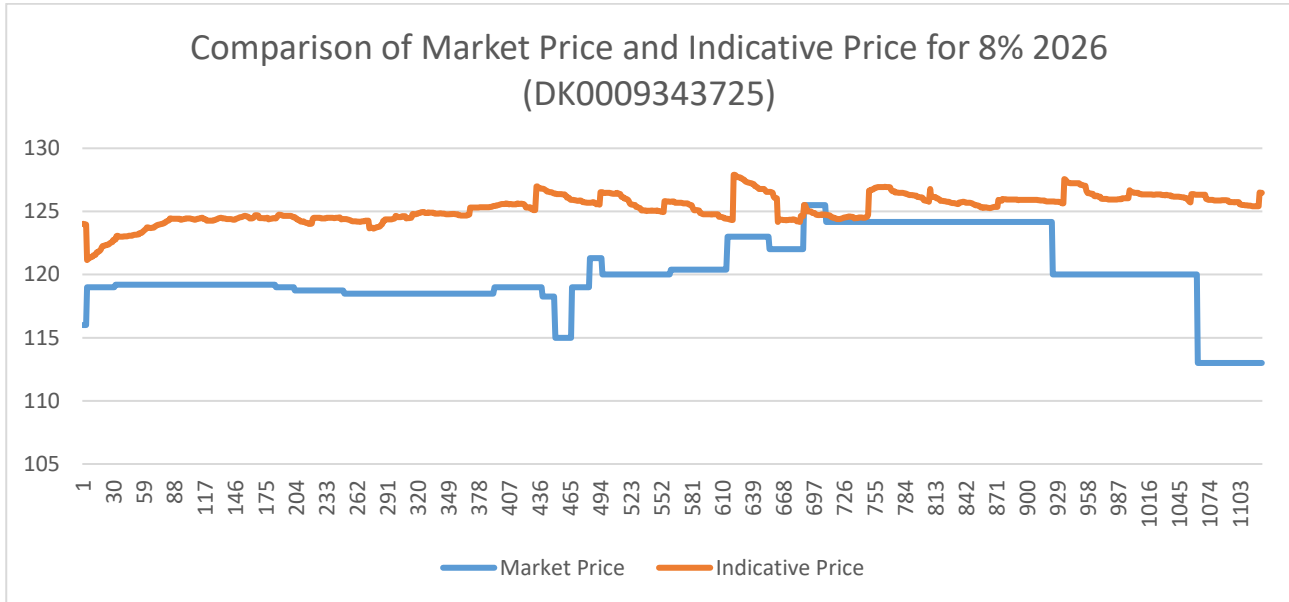


Figure 8:



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 11 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

Figure 9:



One sees clearly the new features in the extended model:

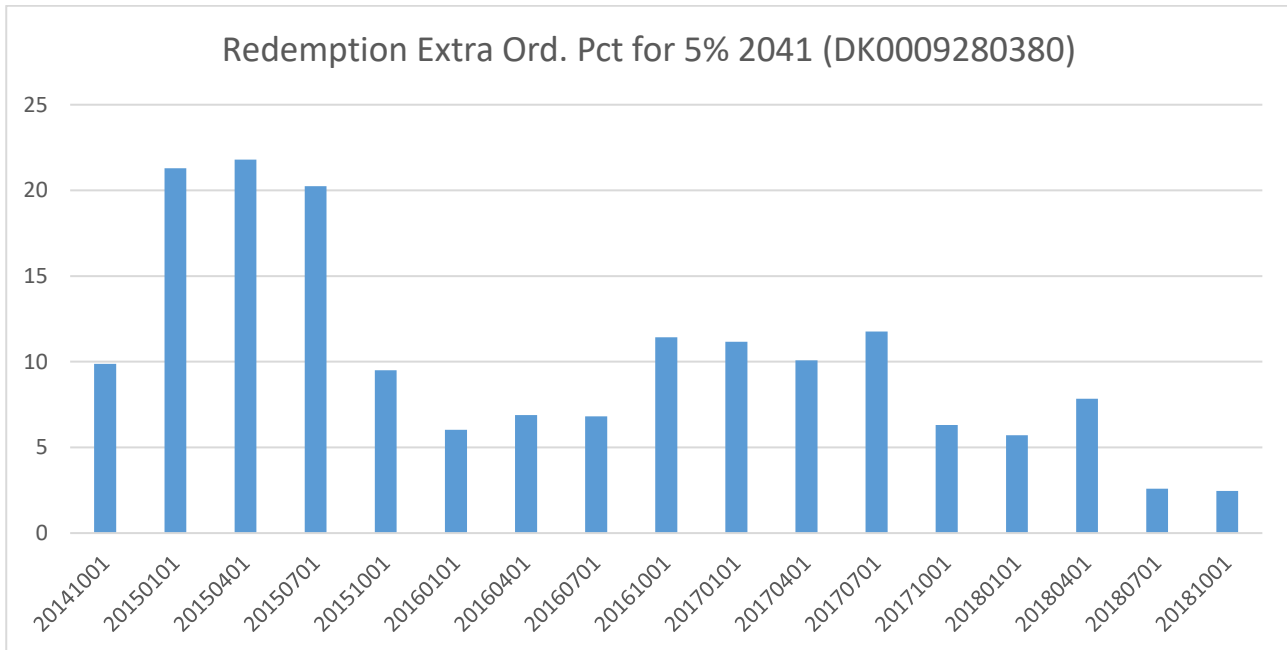
- The Indicative Price does not jump as much as the Market Price - which has a fairly high degree of discontinuity in the price pattern. Put in another way – we do not take all price movement as being valid!
- One also sees the price jump in Indicative Prices that is connected to Re-Payments, see for example 5% 2041 (DK0009280380) – where it is very evident.

For the period we are looking at, below are shown the Re-Payments for 5% 2041 (DK0009280380):



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 12 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

Figure 10:



All in all we are satisfied with the extensions! The Indicative Price pattern is not prone to discontinuous price jumps, which are not related to one of the following events:

- Price jumps driven by Re-Payments
- Price changes that are significant for the overall market movements

Calculation of Indicative Prices for Danish Government Bonds

Firstly we will point out, that we only calculate Indicative Prices for Fixed Rate nominal Government Bonds.

This standard in the market when one wants to obtain an Indicative Price for a Fixed-Rate Nominal Government Bond, is:

- Use an appropriate yield-curve (could be either the derived from swap-rates (etc), alternatively from priced/liquid Government Bonds, with some spread assumptions)

As is well known we have opted for another approach, namely to rely on a relative pricing methodology – which is explained below for Fixed-Rate Nominal Government Bonds.

Our relative pricing procedure is as follows for Government Bonds (follows along the same lines as we in the original paper from 12. May 2017 introduced for FlexBonds):



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 13 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

- We define bonds that are feasible to be used as basis for our relative pricing, as bonds that mature “close” to the dependent bond – the one for which we wish to calculate an Indicative Price
 - The portfolio of bonds that is available as reference bonds is used to calculate a price adjustment for the dependent bond from yesterday until today – keeping the price relationship intact
 - It is also required that:
 - We have prices for all the bonds in the reference portfolio
 - The bonds in the reference portfolio were priced/traded when the dependent bond was last traded/priced
- If no bonds can be found the following fall back procedures exist:
 - If the bond only has one-payment left, we ensure that the bond converge to par at expiry date
 - If the bond has more than one-payment left, 2 possible methods are available:
 - If a yield-curve can be used – meaning we do not need to employ extrapolation - we will use the yield-curve together with the last known/calculated yield-curve spread to obtain the Indicative Price
 - If a yield-curve cannot be used – then we will use the last known/calculated yield-to-maturity to calculate an Indicative Price

The yield-curve used is derived from the set of FlexBonds that is traded/priced. This means that all pricing is done relative to the FlexBonds Yield-Curve.

When calculating the Indicative Price, we are actually in practice calculating a price-adjustment which is to be added/deducted from the last traded price for the dependent bonds. Price-adjustments are calculated on a daily basis, this means that a price-adjustment for time T is defined as the price-adjustment at time T-1 plus the daily adjustment from date T-1 to T. The model has an embedded learning process, in that new information entered into the model - this being new prices - will influence how the model perceive the relationship that exist between bonds, and therefore how the reference portfolio interacts with the dependent bond in order to assess the daily price-adjustment.

Besides this the Indicative Pricing model also has the following ingredients:

- The reference portfolio is constructed with the intention that “enough” bonds are in it, to make it less likely that the price-adjustment on the dependent bond is influenced by only a few bonds. This is however not an easy task in this case, as there are relatively few Fixed Rate Nominal Government Bonds

The model ensures that daily price-adjustment does not make the Indicative Price on the dependent bonds move erratic compared to the market in general.



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 14 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

Some Results

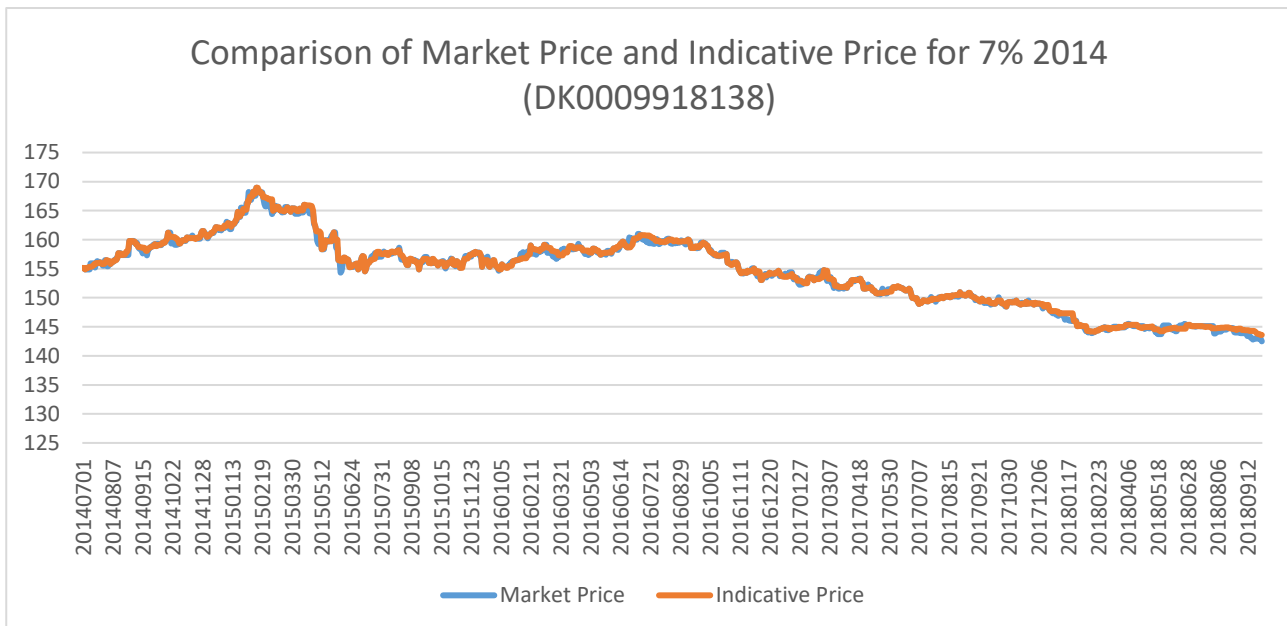
As of 1. October 2018, there exist 6 Government Bonds.

The period data is shown for is 1. July 2014 – 1. October 2018.

Let us look at just one bond here, we have selected the following:

- 7% 2024 (DK0009918138)

Figure 11:



Calculation of Indicative Prices for Floating-Rate Mortgage Bonds

The main new addition to the asset universe is the inclusion of Floating-Rate Mortgage Bonds.

Floating-Rate Mortgage Bonds comes with a lot of different flavours, below is listed the most important features:

- We have pure Floaters – with or without an embedded Prepayment option
 - Coupons can be floored at 0%
- We have Capped Floaters – with or without an embedded Prepayment option
 - Coupons can be floored at 0%
- We have One-Way-Floaters



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 15 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

More details about Floating-Rate Mortgage Bonds can be found in the paper “Modelling Danish Mortgage Bonds”, from 17th August 2015. For more on negative rates, please refer to, “Negativ Kupon – Beredskabsplan for negativ kupon”, VP Securities, Marts 2015.

From a pricing point of view, Floating-Rate Bonds are relatively straightforward to price as long as:

- They are not Capped
- Coupon is not floored at 0% (or just floored in general)
- There is no embedded Prepayment Option

To price the more complex Floating-Rate Mortgage Bonds (which is the dominant type), this require the following building blocks:

- A Yield-Curve
- A volatility structure
- A stochastic interest rate model
- A Prepayment Model
 - If Prepayment Option is embedded
- A Pricing methodology

The standard in the market when one wants to obtain an Indicative Price is:

- Use own pricing model, with specific OAS assumptions

In the market it is standard when pricing and calculating risk-measures to ignore the embedded Prepayment Option (if it exist).

When it comes to which pricing methodology to use, the market does not have one uniform approach:

- Some uses Monte Carlo simulation
 - Here the challenge is the handling of the embedded Prepayment Option
- Some uses a Lattice based approach
 - Here the challenge is keeping track of potential multiple state variables

Which respect to Volatility Structure, we have volatility smile challenges. As a rule of thumb volatility smile is not embedded in the pricing procedures used by the market participants.

We do not want to rely on any particular pricing model for the calculation of Indicative Prices for Floating-Rate Mortgage Bonds, so we have decided – not surprisingly – to employ a relative pricing methodology, which for Floating-Rate Mortgage Bonds is explained below.

Our relative pricing procedure is as follows for Floating-Rate Mortgage Bonds:



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 16 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

- We define bonds that are feasible to be used as basis for our relative pricing, as bonds that mature “close” to the dependent bond – the one for which we wish to calculate an Indicative Price
 - The portfolio of bonds that is available as reference bonds is used to calculate a price adjustment for the dependent bond from yesterday until today – keeping the price relationship intact
 - It is also required that:
 - We have prices for all the bonds in the reference portfolio
 - The bonds in the reference portfolio were priced/traded when the dependent bond was last traded/priced
- If this does not succeed, we will construct a new reference portfolio – though we will be more strict about which bonds we wish to incorporate into our reference portfolio
 - Here we will however not require that the bonds in the reference portfolio were priced at the last time the dependent bond was traded/priced. This portfolio will be used to calculate the change in price since yesterday – and use this as a proxy for the change in price since yesterday for the dependent bond
- If no bonds can be found the following fall back procedures exist:
 - If the bond only has one-payment left, we ensure that the bond converge to par at expiry date
 - If the bond has more than one-payment left, we will:
 - We will use the yield-curve together with the last known/calculated yield-curve spread to obtain the Indicative Price
 - The tricky part is here the Cash-Flow. We will generate a Cash-Flow assuming there is not embedded Prepayment Option, taking into the account the refinancing pattern and the Interest-Rate Base-Spread. This Cash-Flow will be used in our fall back pricing procedure
 - In case there is an embedded Prepayment Option, we will also generate the Cash-Flow under this assumption and use this to cap the derived Indicate Price
 - The extension introduced above for how to handle price jumps associated with repayments is also implemented for Floating-Rate Mortgage Bonds (when applicable)

The yield-curve used is derived from the set of FlexBonds that is traded/priced.

When calculating the Indicative Price, we are actually in practice calculating a price-adjustment which is to be added/deducted from the last traded price for the dependent bonds. Price-adjustments are calculated on a daily basis, this means that a price-adjustment for time T is defined as the price-adjustment at time T-1 plus the daily adjustment from date T-1 to T. The model has an embedded learning process, in that new information entered into the model - this being new prices - will



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 17 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

influence how the model perceive the relationship that exist between bonds, and therefore how the reference portfolio interacts with the dependent bond in order to assess the daily price-adjustment.

Besides this the Indicative Pricing model also has the following ingredients:

- The reference portfolio is constructed with the intention that “enough” bonds are in it, to make it less likely that the price-adjustment on the dependent bond is influenced by only a few bonds
- The model ensures that daily price-adjustment does not make the Indicative Price on the dependent bonds move erratic compared to the market in general

Which Bonds are included?

The following rules are used to select bonds that we call Floating-Rate Mortgage Bonds:

- Isin-Code list: 20, 41, 46, 47, 49, 63, 89, 91, 92, 93, 95, 97
- Bonds have to have a Floating-Rate Coupon
- Bonds have to mature in more than 30-days and less than 11 years
- The outstanding amounts have to be higher than 0 (zero)

As of 1. October 2018 this amount to 138 Floating-Rate Mortgage Bonds.

Some Results

To illustrate our Indicative Pricing model for Floating-Rate Mortgage Bonds, we have selected the following bonds:

Isin	Maturity Date	Callability	IR Spread	Cap	CallPrice	Floored at 0%?
DK0009510646	20191001	I	0.24	0.00	0	0
DK0009778888	20210701	K	0.20	5.00	105	1
DK0009788689	20230701	K	0.60	5.00	105	1
DK0009515959	20280701	K	0.23	3.00	105	0
DK0004909116	20361001	K	0.80	5.00	105	0
DK0009275703	20380101	I	0.00	0.00	0	1
DK0009367070	20411001	K	0.50	6.00	105	1

As can be seen from the above table, we have selected different types of Floaters – from the simple to the – from a pricing perspective – complex ones.

The period data is shown for is 1. July 2014 – 1. October 2018.



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 18 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

Figure 12:

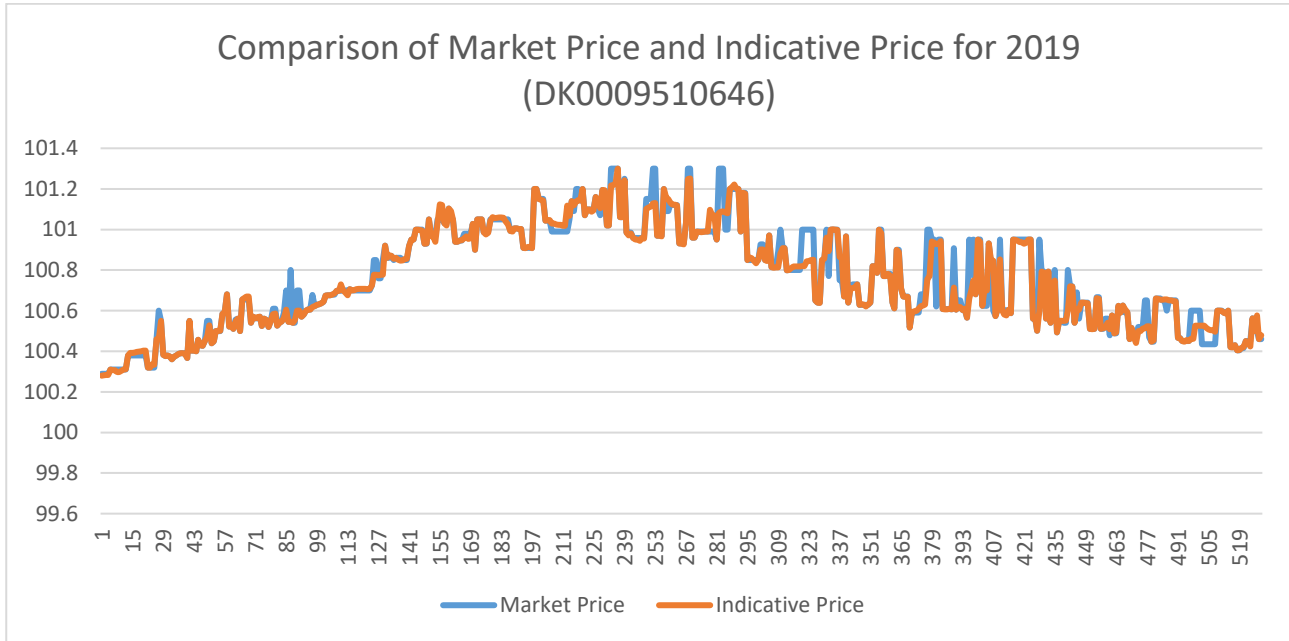
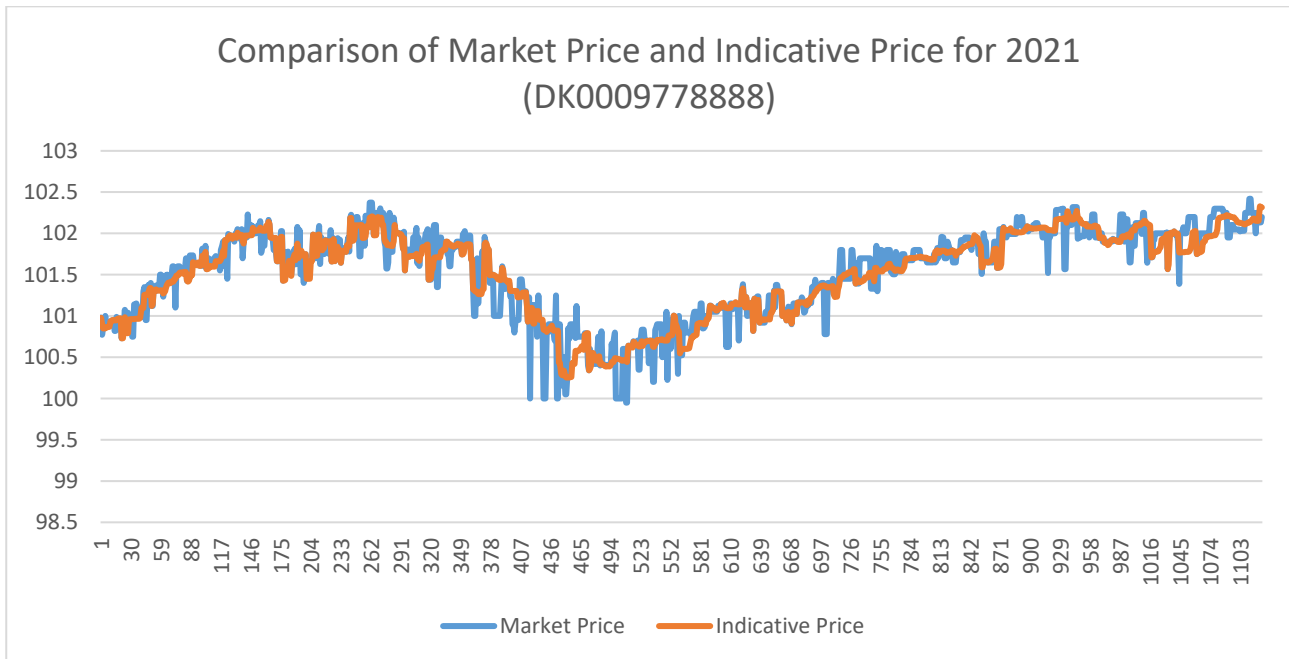


Figure 13:





Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 19 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

Figure 14:

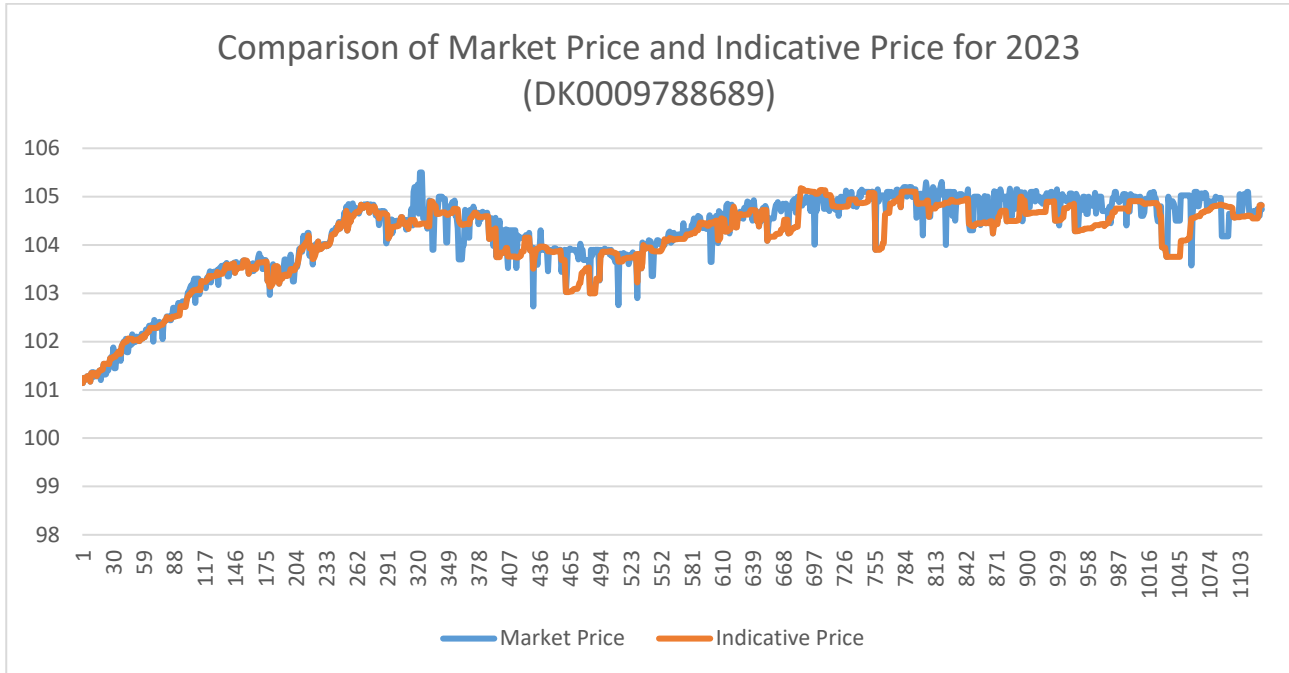
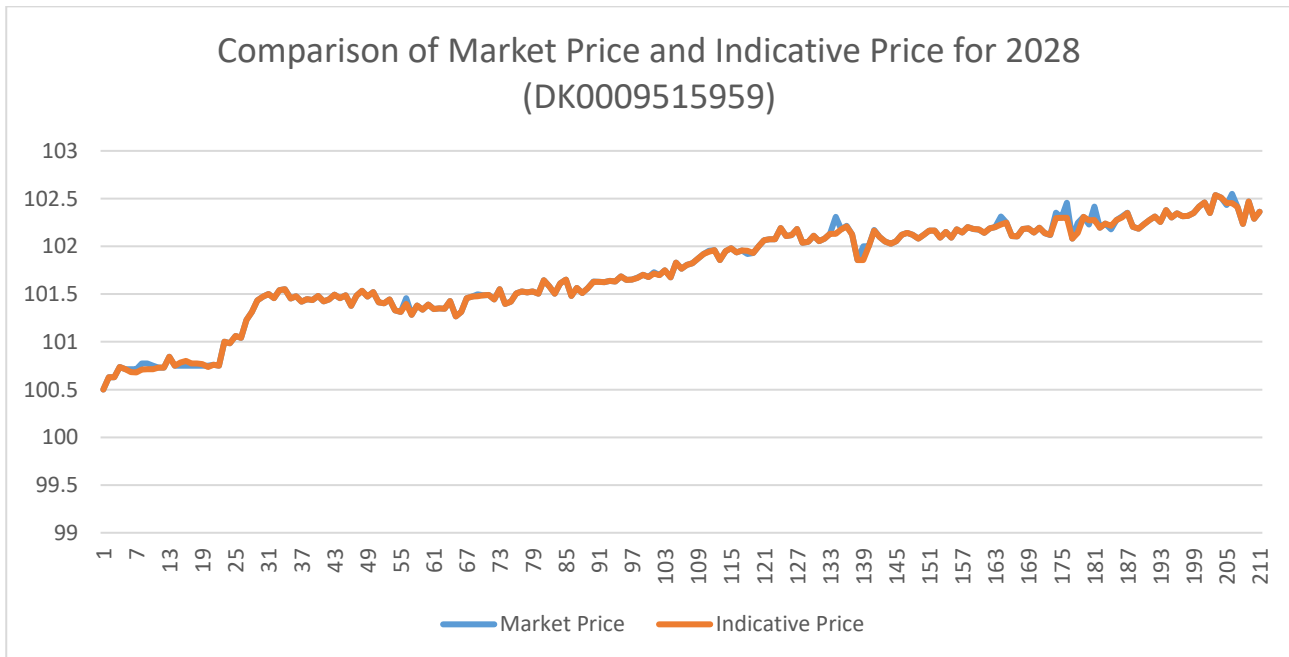


Figure 15:





Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 20 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

Figure 16:

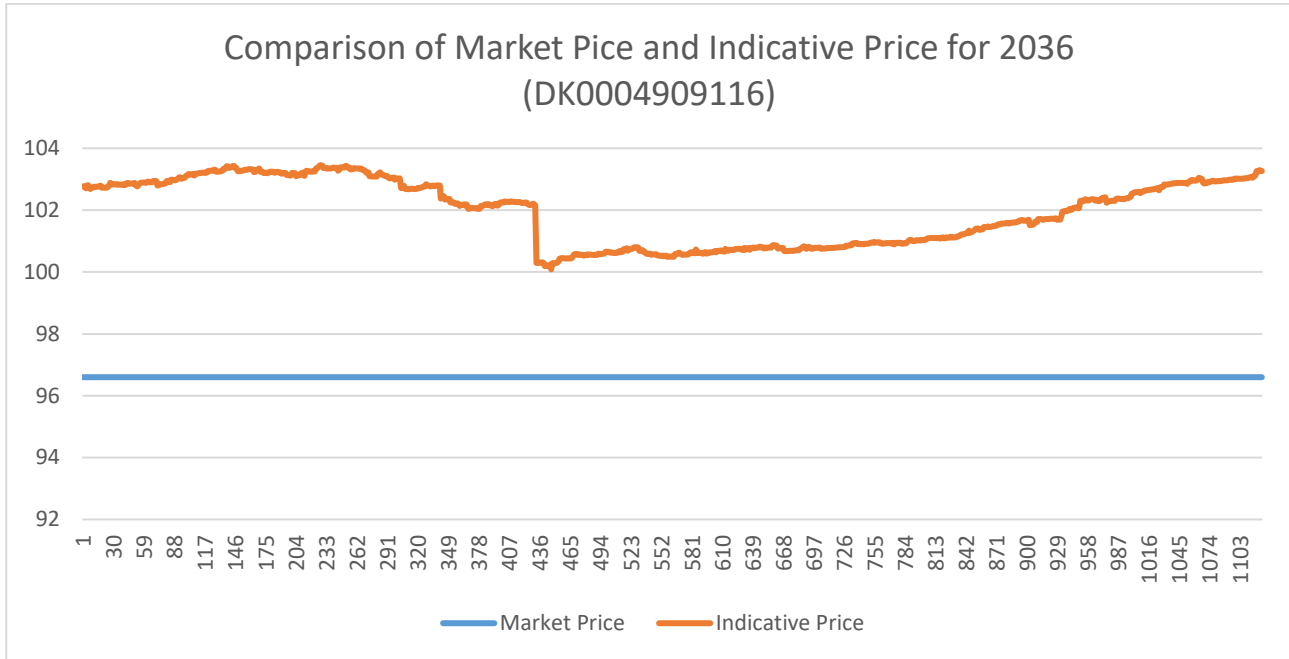
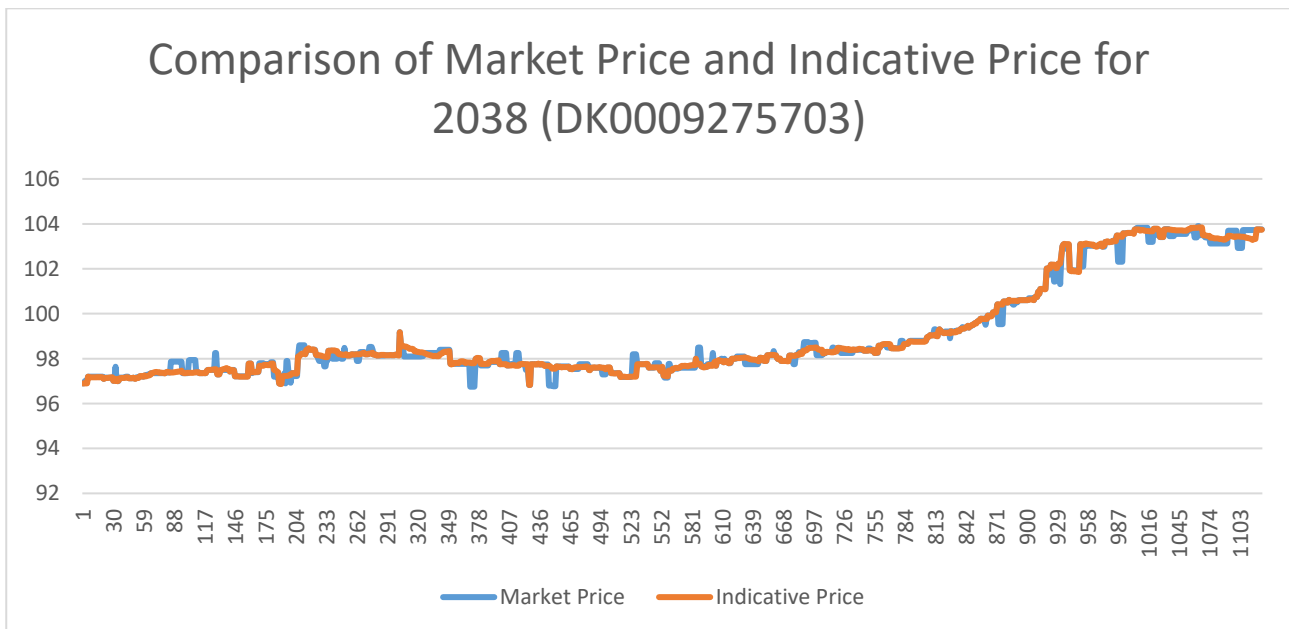


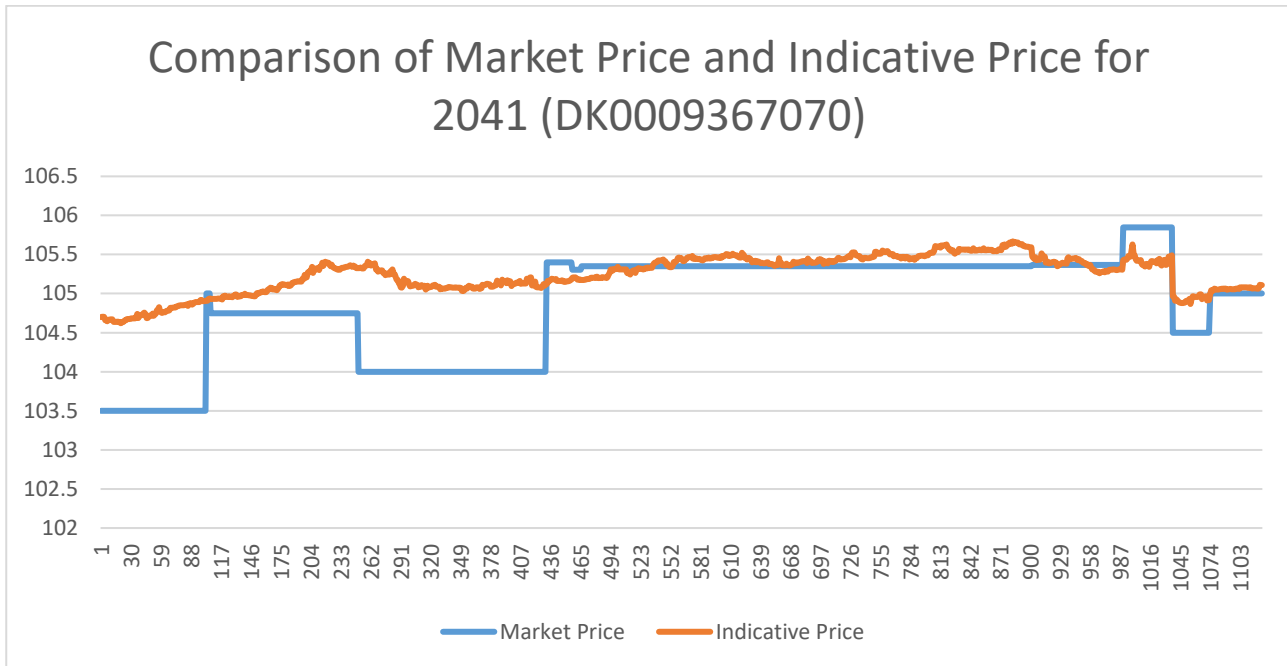
Figure 17:





Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 21 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

Figure 18:



It seems like our Indicative Pricing model for Floating Rate Mortgage Bonds captures the overall trend in the market, while not being prone to the same amount of discontinuity in the Market Price that can be observed in certain cases.

Across the different types of Floating Rate Mortgage Bonds, the model takes into account the different features in a satisfactory manner.

Concluding Remarks

We have in this paper firstly introduced and documented the new extended model for Indicative Prices.

This new extended model has the following additional features:

- Price jump that is associated with Re-Payments has now been implemented
- Not all observed market price changes are taken for granted. It is required in order to be considered a valid price change, that sufficient traded volume support the observed price move

Secondly, we extended the universe that are calculated Indicative Prices, with:

- Fixed Rate Nominal Government Bonds
- Floating Rate Mortgage Bonds



Document Title Indicative Prices for Danish Mortgage Bonds		Version 1.0	Page (Total) 22 (23)
Author FinE Analytics	Approved by	Approved Version	Approval Date

FinE Analytics/26. October 2018

This Version: 25. February 2019

Claus Madsen

Mail: cam@fineanalytics.com



Document Title	Version	Page (Total)
Indicative Prices for Danish Mortgage Bonds	1.0	23 (23)
Author	Approved by	Approved Version
FinE Analytics		Approval Date

References

Høegh, Mikkel (2018) “Investorerne storshopper danske realkreditobligationer”, 4. October 2018, <https://finans.dk/investor/ECE10911220/investorerne-storshopper-danske-realkreditobligationer?ctxref=ext>

Madsen, Claus (2015) ”Modelling Danish Mortgage Bonds”, 17. August 2015, http://fineanalytics.com/wp-content/uploads/2016/10/the_danish_mortgage_bond_market.pdf

Madsen, Claus (2017) “Indicative Prices for Danish Mortgage Bonds”, 12. May 2017, <http://fineanalytics.com/2017/05/12/indicative-prices-for-danish-mortgage-bonds/>

VP Securities (2015) “Negativ Kupon – Beredskabsplan for negativ kupon”, VP Securities, Marts 2015