

NORDIC BOND PRICING

Index Methodology

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1 Index Description

The Nordic Bond Pricing (NBP) Index family is composed of a universe of bonds issued by Norwegian and foreign domiciled issuers with bonds registered in the Norwegian CSD (VPS). The indices are created to offer fixed income investors an independent benchmark to evaluate the performance of their portfolios. The Index family is constructed in order to meet different needs of investors, thus it aims to provide a relevant and accurate image of the performance of the broad Norwegian bond market, in aggregate and based on more specific investment mandates. The fundamental philosophy behind the indices are as follows:

- Transparent and objective rules, in order to provide investors with a transparent set of constituents eligible for inclusion and exclusion from the index.
- The eligibility rules aim to substantiate investability and replicability, in order to provide a plausible return benchmark.
- Hierarchical structure of the index family.
- The methodology strives at providing stability to the indices. Essential to a good benchmark is a good understanding of the month-to-month changes, only changes in the general market conditions should lead to noticeable changes to the index.

The goal of this publication is to provide the index users with the philosophy behind the creation of these indices, their construction and the accuracy of the measures used to explain the performance of the underlying markets for the different indices. First the index family is presented, including the various criteria and conventions used throughout. Subsequently, the rebalancing process and the method for publication as well as its frequency are disclosed. Lastly the underlying calculations for return and various key ratios are presented before the document is rounded off with information of practical matter.

1.1 The index family

Figure 1.1 gives an overview of the NBP index family. Current indices cover the government market (GOV), the high yield market (HY) and regular market (RM). This section will describe the NBP indices for all markets. The segregation between the Regular Market and High Yield Market is done in accordance with the

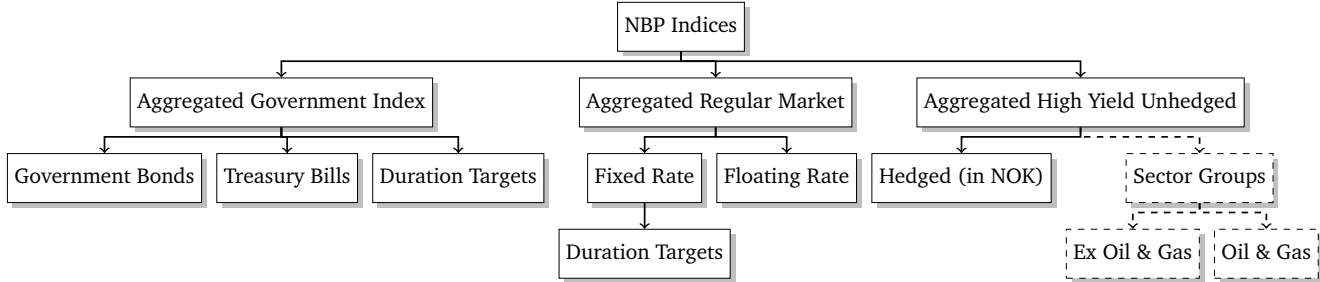


Figure 1: NBP Index family

principles as outlined in Appendix B. The segregation is based on the price level of the constituents, in terms of a credit spread, relative to a reference curve as defined for the various tiers of securities as communicated by NBP.

1.1.1 Regular market

The regular market branch of the index family consists of an aggregate index, which contains all eligible bonds in the regular market universe. Based on the RM universe two indices will be calculated based on their interest type, one consisting of solely fixed rate issues and one of solely floating rate issues. From the

set of fixed rate issues three duration targeted indices are calculated, with duration targets of 1, 3 and 5. The universe is then divided into their respective RM sector groups, defined in section 1.5.2. For each RM group (except RM group 4) one pure floating rate index and three fixed rate indices with a modified duration target of respectively 1, 3 and 5. With a monthly rebalancing process the target will be aimed at achieving a monthly average duration of the specified target. Details about the methodology can be found in appendix C.

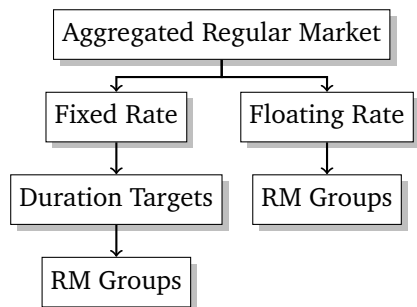


Figure 2: Regular Market Branch

1.1.2 High Yield market

The high yield branch of the index family consists of an aggregate index, which contains all eligible bonds in the high yield universe. The current high yield universe consists of securities with NO ISIN, denominated in all currencies specified in appendix A. The high yield universe will be available both as a currency hedged index and as an unhedged index. The hedged index will be delivered as hedged in NOK, but can be custom made for other currencies.

The unhedged High Yield index can be delivered as sectoral sub-indices. Subject to demand there will be one index consisting of bonds solely from the oil & gas industry (including E&P), which makes out a great share of the market value in the High Yield NO ISIN universe. The residual securities may form a sub index of bonds not related to the oil & gas industry.

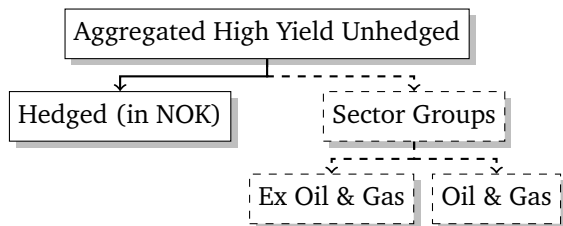


Figure 3: High Yield Branch

1.1.3 Government market

The government market branch of the index family consists of an aggregate index, which contains all eligible Norwegian government bonds and bills. Based on instrument types, the aggregate index is split in a all bonds and a all treasury bills indices. Five duration targeted indices are calculated, with modified duration targets of 0.25, 0.5, 1, 3 and 5. Given a monthly rebalancing, the duration target will be achieved by a monthly average duration of the specified target. Details on the duration target methodology can be found in appendix C.

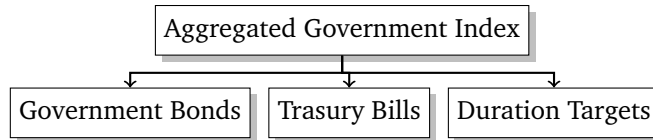


Figure 4: Government Market Branch

1.2 Eligibility Rules

The NBP Bond Indices are total return indices based on carefully designed eligibility rules, in order to provide index transparency and objectiveness. Further, the index rules are designed with the goal of providing a representative benchmark for the bond market accessible to professional investors. The following rules will be applicable for all indices:

- New securities qualify for inclusion in this month's index if the required security reference information and pricing are readily available on the selection date (defined in section 2.1).
- No securities can have an issue date later than the next rebalancing date.
- All issues must have an ISIN which starts with 'NO'.
- No convertible bonds are included.
- Both floating and fixed rate instruments are eligible.
- All securities should at the rebalancing date, and with reference to the amount registered by Stamdata, have a minimum of NOK 300 million of outstanding amount. For issues denominated in currencies other than NOK (applicable for the high yield branch) the exchange rate on the selection date is used when converting the outstanding amount into NOK to evaluate this criterion.
- Securities declared to be in default or in insolvency proceedings ¹ will be excluded upon the first rebalancing date following the registration of such an event. The technical treatment will be further elaborated in section 3.4.
- Many of the securities in the Nordic region are placed among a limited number of investors. However, to ensure that the indices constitute relevant benchmarks for the market available to professional investors on an ongoing basis, some securities may be defined as private placements and excluded from the index universe. The classification as private placement will be done at NBP's sole discretion and based on information available at the time of decision. NBP will in general emphasize on the ownership distribution for the aggregated amount of similar securities issued by the same issuer.

1.2.1 Specific rules for the Regular Market Indices

Securities eligible for inclusion in the Regular Market universe must be denominated in NOK. Only bonds with at least one month to expected maturity ² at the rebalancing date are included.

Embedded optionality in the form of call/put options are only allowed for the Regular Market universe when the first call/put date is assumed to be the expected redemption date and is embedded in covered, hybrid and subordinated bonds. Thus, for bonds other than those mentioned in the latter, only bullet bonds without options are eligible.

To ensure that the market will have access to relevant information and that the constituents in general could be assumed to have public interest only securities that are publicly listed or are in the process of applying for listing are included. In instances where this process at each rebalancing date exceeds one year, the relevant security will be excluded³.

1.2.2 Specific rules for the High Yield Indices

Securities eligible for inclusion in the High Yield universe are allowed to be denominated in currencies other than NOK. These currencies are defined in appendix A. NBP may decide to amend the list of eligible currencies. Bonds must have a minimum of 12 months to maturity upon inclusion into the index, but will be eligible to stay in the index until there is one month until maturity.

Bonds with regular call and/or put options are allowed in this branch of the index family. Bonds with a step-up schedule will be included in the index, if a predetermined schedule exists. Payment-in-kind (PIK) bonds and toggle notes are also included, with the methodology to handle these special events explained in section 3.3. Unlike the Regular Market branch, serial and irregular redemption types are allowed for in addition to bullet bonds.

1.2.3 Specific rules for the Government Market Indices

Securities eligible for inclusion are bonds and treasury bills issued by the Norwegian government and denominated in NOK. Only bonds or treasury bills with at least one month to maturity at the rebalancing date are included.

1.3 Index Pricing

All the calculations will be based on evaluated prices provided by NBP. Bonds in the index will be priced at the evaluated market price ("EVAL"), usually considered as a mid price. Bonds will also enter and exit the index at the EVAL price.

1.4 Accrued Interest

1.4.1 Settlement Convention

The daily assumption is a same day settlement (T+0), except of the rebalancing date in December; then, settlement is assumed to be on the last calendar day of the month.

1.4.2 Calculations

The accrued interest is calculated for the period between the previous coupon date and the settlement date. Calculations are done in accordance with the day count convention as specified for accrued coupon payments in the loan agreement, alternatively the coupon payment convention (paid over) following from the Recommended Conventions for the Norwegian Certificate and Bond Markets (NFF).

1.5 Classifications

1.5.1 Sectoral Classification

Sectoral classification will in general be based on the sectoral classifications as defined by Stamdata.

1.5.2 Regular Market Groups

The definition of the Regular Market (RM) groups are based on the sectoral classification from 1.5.1 and instrument class (seniority).

Regular Market Group 1 (RM1)

Bonds issued by all Norwegian counties and municipalities. Covered bonds will also be included in this group, in accordance with the *Covered Bonds Regular Market* definition as set out in Appendix B.

Regular Market Group 2 (RM2)

Senior issues from financial institutions will be included in accordance with the *Senior Bonds Financials Regular Market* definition as set out in Appendix B.

Regular Market Group 3 (RM3)

All other senior issues not covered by the definition of RM1 and RM2, in accordance with the *Senior Bonds ex Financials Regular Market* definition as set out in Appendix B. Subordinated issues in accordance with the *Subordinated Financials Regular Market* definition as set out in Appendix B.

Regular Market Group 4 (RM4)

Securities otherwise eligible in the Regular Market Indices, but not included in any of the RM groups defined above. Mainly hybrid bonds in accordance with the *Hybrid Bonds Regular Market* definition as set out in Appendix B.

1.5.3 Government (GOV)

Bonds and treasury bills issued by the by the Norwegian Government, denominated in NOK.

1.6 Holiday Convention

All indices in the NBP index family follows the Norwegian holiday calendar. Since the HY branch of the corporate bond index family are made up by multiple currencies, the closing FX rate of the previous day will be used on days where WM/Reuters do not publish closing FX rates due to local holidays.

2 Index Rebalancing and Publication

2.1 The Rebalancing Process

In the rebalancing process there are two dates of interest; the *rebalancing date* on the last business day of the month and the *selection date* which is three business days prior to the rebalancing date. All NBP bond indices are rebalanced on a monthly basis, after the close of business on the rebalancing date. On the rebalancing date, unless otherwise specified, sets of market value weights are calculated for the constituents of the various indices. The set of constituents and their respective weights are held constant throughout the month until the next rebalancing date, as it will be used in the return calculations.

On the selection date, after the close of business, all securities eligible on the previous rebalancing date will again be considered whether they still meet the requirements of the relevant index. In addition to the existing set of index eligible securities, all new issues with available prices and principal amount that meet the eligibility rules will be included. For securities that are denominated in currencies other than NOK, the FX rate on the selection date will be used to assess the minimum outstanding amount criteria. Further, the listing status of all bonds needs to be available. The bonds will be divided into the Regular Market and High Yield universe based on their price level on the selection date. The set of securities that meets the requirements listed in this section and 1.2, will constitute the maximum number of issues that will be eligible on the rebalancing date. Which means that no new bonds will be allowed into the list of constituent's post selection date.

On the rebalancing date, after the close of business, the set of securities that was decided upon on the selection date will be reassessed. The requirement of a minimum of NOK 300 million outstanding will be assessed for securities which have been affected by corporate actions, e.g. currencies fluctuations will not affect the sample between the selection date and the rebalancing date. Issues with changes to their maturity which causes the bond to no longer fulfill the required remaining maturity, as specified for their index in 1.2 will be excluded. Following this reassessment, all prices, FX rates and principal amounts are updated. The resulting universe will now constitute the next month's index universe.

Intra month changes to the constituents due to corporate action will be reflected in the return of the index where the relevant constituent is included, but will not change the weight of the constituent in the index as set at the last rebalancing date nor will it change the status of an issue from eligible to ineligible during the month. This extends to non-overlapping indices, a bond will not change its index affiliation due to changes in its sector mapping nor pricing level intra month. Further, all intra month payments (interest, principal etc.) earns no reinvestment income intra month but contributes to the total return of the index and will be reinvested pro rata across the entire index at the next rebalancing date.

2.2 Index History

The index base date is December 31st 2014 (index value=100), with the first adjustment made on the last business day in January 2015.

2.3 Publications

On the first business day following the selection date, a preliminary list of the constituents for the next month will be published. No additional securities will be included in the index following the selection date, and thus this list reflects the maximum number of issues to be included in the index on the rebalancing date. The final list of next month's constituents will be published during business hours on the first business/calendar day following the rebalancing date.

2.4 Corrections

NBP strives to produce indices free of errors; however, there may be occasions where erroneous data is published. Such errors may be caused by incidents of pricing errors or incorrect reference information. If such an event were to occur, it would in the most extreme cases entail a restatement. A restatement of the indices would only be relevant if the magnitude of the error will have a significant impact on the daily/monthly index values, in aggregate or sectoral. If such an event occur NBP reserves the right to recalculate the affected indices. NBP will in such events give notice to affected clients. Minor errors in the return calculations for a constituent, due to e.g. insufficient information about a corporate event, may occur. NBP will correct such errors by offsetting the erroneous calculation when the error is detected and confirmed.

2.5 Precision and Quality Control

- Exhaustive information regarding corporate action data, that can/will affect index return, may not always be timely available at all times. NBP will therefore use its best effort, based on the available information, to adjust the affected return components on the record date of the corporate actions.
- Index values will be rounded off to 6 decimals.
- Return values will be rounded off to 10 decimals.
- All sub-indices will be calculated as long as there exist one or more eligible bonds. In instances where this is not fulfilled, the previous months level will be continued. This exception extends to a maximum of six months (six replications), at which point the index will be dissolved.

3 Index Calculations

3.1 Total Return

The month-to-date index total return in local currency (TR^{LC}), on any given date t , is defined as the sum of the weighted return of the n constituents of the index.

$$\text{TR}_t^{\text{LC}} = \sum_{i=1}^n w_{i,t-s}^{\text{MV}} \times \text{TR}_{i,t}^{\text{LC}} \quad (1)$$

where $w_{i,t-s}^{\text{MV}}$ is the monthly market value weight of constituent i set on the last rebalancing date, $t - s$.

$$w_{i,t-s}^{\text{MV}} = \frac{\text{MV}_{i,t-s}}{\sum_{i=1}^n \text{MV}_{i,t-s}}, \text{ where } \sum_{i=1}^n w_{i,t-s}^{\text{MV}} = 1 \quad (2)$$

The security level calculation of total return in local currency will be divided into 5 components: price return, coupon return, paydown return, redemption return and the return on all extra cash payments.

$$\begin{aligned} \text{TR}_{i,t}^{\text{LC}} &= \frac{\text{MV}_{i,t} + \text{Cash}_{i,(t-s,t)} - \text{MV}_{i,t-s}}{\text{MV}_{i,t-s}} \\ &= \underbrace{\frac{\text{P}_{i,t} - \text{P}_{i,t-s}}{\text{P}_{i,t-s} + \text{AI}_{i,t-s}}}_{\text{Price Return}_{i,t}} + \underbrace{\frac{\text{AI}_{i,t} - \text{AI}_{i,t-s} + \text{Coupon}_{i,t}}{\text{P}_{i,t-s} + \text{AI}_{i,t-s}}}_{\text{Coupon Return}_{i,t}} + \underbrace{\frac{\text{Extra Cash}_{i,t}/\text{N}_{i,t-s}}{\text{P}_{i,t-s} + \text{AI}_{i,t-s}}}_{\text{Extra Cash Return}_{i,t}} \\ &\quad + \sum_{q=1}^{Q_i} \left(\alpha_{i,q,t} \left[\underbrace{\frac{\text{K}_{i,q} - \text{P}_{i,q,r}}{\text{P}_{i,t-s} + \text{AI}_{i,t-s}}}_{\text{Redemption Return}_{i,t}} + \underbrace{\frac{(\text{P}_{i,q,r} + \text{AI}_{i,q,\text{settle}}) - (\text{P}_{i,t} + \text{AI}_{i,t} + \text{C}_{i,m})}{\text{P}_{i,t-s} + \text{AI}_{i,t-s}}}_{\text{Paydown Return}_{i,t}} \right] \right) \end{aligned} \quad (3)$$

where $q = 1, \dots, Q_i$ is the corporate actions for bond i in the index period, and $\alpha_{i,q,t}$ takes on different values depending on the nature of the relevant corporate action.

$$\alpha_{i,q,t} = \begin{cases} (1 - b_{i,t}) \times C_{i,t} & , \text{ if PIK} \\ \text{N}_{i,q,t}/\text{N}_{i,t-s} & , \text{ if redemption} \\ 0 & \text{ else (e.g. bullet bonds without any corporate actions)} \end{cases}$$

In the function above, $b_{i,t}$ denotes the share of a coupon payment $C_{i,t}$ that is settled in cash. $\text{N}_{i,t-s}$ is the notional amount outstanding at the last rebalancing date and $\text{N}_{i,q,t}$ is the amount redeemed for corporate action number q at date t . P denotes the clean price, AI the accrued interest and $\text{AI}_{i,q,\text{settle}}$ captures any accrued interest payment up to the settlement date for corporate action q . The clean price on the record date of the corporate action is denoted as $\text{P}_{i,q,r}$ and coupon payments made post settlement of redemption, on date m , is denoted as $\text{C}_{i,m}$. $\text{K}_{i,q}$ can take on four different values, depending on what corporate action that leads to the change in the outstanding amount:

$$K_{i,q} = \begin{cases} \text{Call/put price} & , \text{ if partial call/put} \\ \text{Par/Contractual amortization price} & , \text{ if amortization} \\ \text{Market price/agreed offer price} & , \text{ if buy back} \\ 0 & , \text{ PIK coupon} \end{cases}$$

The redemption return measures the price return from deviations between any agreed price $\text{K}_{i,q}$ and the clean price $\text{P}_{i,q,r}$ on the record date of redemption. Paydown return, on the other hand, captures the potential loss of future cash flows following early redemption. This adjustment is necessary since the total return calculation assumes full investment until next rebalancing date, and thus measures what the investor would have received if the bonds were not redeemed. The last element of (3), $\text{Extra Cash}_{i,t}$, captures any other extra agreed payments for bond i on day t not captured by the other return elements. Modifications to (3) due to various corporate actions and/or PIK bonds will be further elaborated in sections 3.3 and 3.4.

3.2 Index Value

The daily closing index value (IV_t) in local currency (LC) is a function of the prior month-end index value (IV_{t-s}), and the current month-to-date return (TR_t^{LC}) in local currency.

$$IV_t^{LC} = IV_{t-s}^{LC} \times (1 + TR_t^{LC}) \quad (4)$$

3.3 Payment-In-Kind Bonds

This section describes how PIK bonds are handled in the index calculations. All PIK bonds that are not marked as being in non-payment nor trading flat of accrued will accrue interest. This accrued interest will be valued at the market price of the relevant bond. If the PIK status is known at the rebalancing date the accrued interest in the denominator in (3) will be adjusted accordingly. More specifically:

$$\text{PIK adj}_{i,t-s} = \begin{cases} P_{i,t-s}/100 & , \text{ if PIK coupon at } t-s \\ 1 & , \text{ else} \end{cases}$$

The interest that accrue intra month ($AI_{i,t}$) will also be subject to an adjustment according to the daily market price ($P_{i,t}$):

$$\text{PIK adj}_{i,t} = \begin{cases} P_{i,t}/100 & , \text{ if PIK coupon at } t \\ 1 & , \text{ else} \end{cases}$$

A bond that does not have a PIK status at the beginning of the month will change status when a formal approval of such a change to the terms of the bond has been approved or when an interest payment leads to a change in the relevant bond's principal in VPS, whichever event that is observed first.

For PIK bonds the total return in (3) can be expressed as follows for a single coupon payment made either fully or partially in-kind:

$$\begin{aligned} TR_{i,t}^{LC} = & \underbrace{\frac{P_{i,t} - P_{i,t-s}}{P_{i,t-s} + \text{PIK adj}_{i,t-s} \times AI_{i,t-s}}}_{\text{Price Return}_{i,t}} + \underbrace{\frac{\text{PIK adj}_{i,t} \times AI_{i,t} - \text{PIK adj}_{i,t} \times AI_{i,t-s} + b_{i,t} \times C_{i,t}}{P_{i,t-s} + \text{PIK adj}_{i,t-s} \times AI_{i,t-s}}}_{\text{Coupon Return}_{i,t}} \quad (5) \\ & + \alpha_{i,t} \left[\underbrace{\frac{-P_{i,r}}{P_{i,t-s} + \text{PIK adj}_{i,t-s} \times AI_{i,t-s}}}_{\text{Redemption Return}_{i,t}} + \underbrace{\frac{(P_{i,r} + \text{PIK adj}_{i,r} \times AI_{i,\text{settle}}) - (P_{i,t} + \text{PIK adj}_{i,t} \times AI_{i,t})}{P_{i,t-s} + \text{PIK adj}_{i,t-s} \times AI_{i,t-s}}}_{\text{Paydown Return}_{i,t}} \right] \end{aligned}$$

where $b_{i,t} \times C_{i,t}$ is the share of the coupon payment made in cash and $\alpha_{i,t}$ as defined in section 3.1. The sum of the redemption and paydown return can be considered as the market price adjusted value of the PIK coupon. Bonds that enters the index as PIK bonds at the beginning of the month will have $\text{PIK adj}_{i,t-s} = P_{i,t-s}/100$ throughout the month, but if changes are made to the applicable loan agreement which specifies that there shall be no more PIK coupon payments then $\text{PIK adj}_{i,t}$ will be set to 1 following the announcement. Further, all bonds issued intra month will be added to the outstanding amount at the next rebalancing date.

3.4 Intra month special events

3.4.1 Redemptions

1. Full redemption

Securities that are fully redeemed due to a full call, put or buyback will exit the index at their respective call/put or offer price.

$$\text{Adjusted coupon return} = \frac{AI_{i,\text{settle}} - AI_{i,t-s} + C_{i,\text{settle}}}{P_{i,t-s} + AI_{i,t-s}} \quad (6)$$

2. Partial redemption (Buyback, Amortizations and Partial Call or Put)

For corporate actions such as buybacks, amortizations, offers and partial call or put, the calculated price and coupon return assumes that the full position is held throughout the month. To adjust for this effect, paydown return and redemption return will adjust for the reduced market exposure in the respective bond. Paydown return measures the potential loss of all future cash flows following early redemption, that is what the investors would have received if the bonds were not redeemed, while the redemption return measures the premium/discount relative to the market price on the record date of redemption. The price at which the paydown return and redemption return is calculated is given below, as in section 3.1.

$$K_{i,t} = \begin{cases} \text{Call/put price} & \text{if call/put} \\ \text{Par/ contractual amortization price} & \text{if amortization} \\ \text{Market price/agreed offer price} & \text{if buyback} \end{cases}$$

Finally, it should be noted that for amortized bonds, it is assumed that the coupon and installment are paid on the same date.

3.4.2 Defaulted and Non-Payment Bonds

If a bond is marked as insolvent, declared as in non-payment or defaults intra month, any accrued interest and scheduled coupon payments will be nulled following the announcement ($AI_{i,t} = 0$ and $C_{i,t} = 0$)⁴. This will result in a negative coupon return for the defaulted security throughout the month⁵. The price return, as defined in (3) remains unchanged while the coupon return can be rewritten as:

$$\text{Adjusted coupon return} = \frac{0 - AI_{i,t-s} \times \text{PIK adj}_{i,t-s}}{P_{i,t-s} + AI_{i,t-s} \times \text{PIK adj}_{i,t-s}} \quad (7)$$

If the pricing of a defaulted bond is discontinued, the bond will continue to be priced at the last available price until the next rebalancing date where the bond is eliminated from the Index.

3.4.3 Bonds trading flat of accrued

For bond issues where the issuer does not meet its coupon payment obligation, the buyer of the bond is not considered responsible for paying the accrued interest since the last payment was made. Computationally, when bonds are identified as trading flat of accrued then $AI_{i,t} = 0$.

$$\text{Adjusted coupon return} = \frac{0 - AI_{i,t-s} + C_{i,t}}{P_{i,t-s} + AI_{i,t-s}} \quad (8)$$

3.5 Currency Hedging & Returns

Indices consisting of bonds denominated in currencies other than the base currency will have a currency return component in the total return calculation. The calculated currency return can be both hedged (H) and unhedged (UH), with the relevant calculus given in the following subsections. The currency convention will be that of WM Reuters' spot foreign exchange rates and forward fixing at 16:00 GMT.

3.5.1 Unhedged return

Indices with exposure towards other currencies than the *base currency (BC)* of the index will at the beginning of each month buy the bonds denominated in a foreign currency, *local currency (LC)*, and unwind this currency position at month-end. The unhedged total return ($TR^{BC, UH}$) on bond i , denominated in currency j , can be expressed as follows:

$$\text{TR}_{i,j,t}^{\text{BC, UH}} = \text{TR}_{i,j,t}^{\text{LC}} + \underbrace{(1 + \text{TR}_{i,j,t}^{\text{LC}}) \times \frac{\text{FX}_{j,t}^{\text{LC/BC}} - \text{FX}_{j,t-s}^{\text{LC/BC}}}{\text{FX}_{j,t-s}^{\text{LC/BC}}}}_{\text{Currency return}} \quad (9)$$

where $\text{TR}_{(i,j,t)}^{\text{LC}}$ is the total return of bond i in its local currency j . The second part of (9) describes the total currency return, both the pure currency investment and the currency return on the increments in the bonds value. $\text{FX}_{j,t-s}^{\text{LC/BC}}$ and $\text{FX}_{j,t}^{\text{LC/BC}}$ are the foreign exchange rates at respectively the last rebalancing date $t - s$ and the index date t .

The index level of total unhedged return can then be calculated by weighting the return of the individual bonds, in J currencies, by the weights defined in section 3.6.1:

$$\text{TR}_t^{\text{BC, UH}} = \sum_{j=1}^J \sum_{i=1}^n w_{i,j,t-s}^{\text{MV}} \times \text{TR}_{i,j,t}^{\text{BC, UH}} \quad (10)$$

The calculation of the closing index value on day t , given in (4), will for the unhedged index translate into

$$\text{IV}_t^{\text{BC, UH}} = \text{IV}_{t-s}^{\text{BC, UH}} \times (1 + \text{TR}_t^{\text{BC, UH}}) \quad (11)$$

3.5.2 Hedged return

The monthly currency-hedged total index return is based on the assumption of a rolling strategy of buying each foreign currency at the beginning of the month and selling one-month forwards. The value of each currency forward contract is assumed to be the full market value at the beginning of the month, $\text{MV}_{t-s}^{\text{LC}}$. The index will be fully hedged as of the rebalancing date and no adjustments will be made between rebalancing dates to adjust for price movements, corporate actions or any other changes. During the month the market value of the bonds will fluctuate, and thus the return of a hedged index are driven by two components:

1. Growth in the individual bonds' value
2. The hedge itself

For bond i , denominated in currency j , these two components can at time t be summarized as:

$$\text{TR}_{i,j,t}^{\text{BC, H}} = \text{TR}_{i,j,t}^{\text{BC, UH}} + h_{j,t-s} \times \text{HR}_{j,t} \quad (12)$$

where $h_{j,t-s}$ is the hedge ratio and $\text{HR}_{j,t}$ is the hedged return. All indices assume a 100% hedge of the index market value, e.g. $h_{j,t-s} = 1$, unless otherwise stated. The unhedged total return is that defined in (9) and $\text{HR}_{j,t}$ is defined as:

$$\text{HR}_{j,t} = \underbrace{\frac{\text{FWD}_{j,(t-s,1M)}^{\text{LC/BC}} - \text{FX}_{j,t-s}^{\text{LC/BC}}}{\text{FX}_{j,t-s}^{\text{LC/BC}}}}_{\text{Forward Return}} + \underbrace{\frac{\text{FX}_{j,t}^{\text{LC/BC}} - \text{FWD}_{j,(t,T-t)}^{\text{LC/BC}}}{\text{FWD}_{j,(t,T-t)}^{\text{LC/BC}}}}_{\text{Hedge reversal return}} - \underbrace{\frac{\text{FX}_{j,t}^{\text{LC/BC}} - \text{FX}_{j,t-s}^{\text{LC/BC}}}{\text{FX}_{j,t-s}^{\text{LC/BC}}}}_{\text{Currency return}} \quad (13)$$

where $\text{FWD}_{j,(t,T-t)}^{\text{LC/BC}}$ is the linear interpolated forward rate between the current spot and forward rate for daily intra month calculations on day $t < T$, defined as:

$$\text{FWD}_{j,(t,T-t)}^{\text{LC/BC}} = \text{FX}_{j,t}^{\text{LC/BC}} + (\text{FWD}_{j,(t,1M)}^{\text{LC/BC}} - \text{FX}_{j,t}^{\text{LC/BC}}) \frac{\text{remaining days in month}}{\text{actual days in month}} \quad (14)$$

where $FWD_{j,t,1M}^{LC/BC}$ is the one-month forward for currency j on day t . The index level of total hedged return can then be calculated by weighting the return of the individual bonds by the weights defined in section 3.6.1:

$$TR_t^{BC,H} = \sum_{j=1}^J \sum_{i=1}^n w_{i,j,t-s}^{MV} \times TR_{i,j,t}^{BC,H} \quad (15)$$

The calculation of the closing index value on day t , given in (4), will for the hedged index translate into

$$IV_t^{BC,H} = IV_{t-s}^{BC,H} \times (1 + TR_t^{BC,H}) \quad (16)$$

3.6 Weighting

All return calculations are based on monthly weights, fixed on the last rebalancing $t - s$. All index statistics are based on the daily positions, measured by the market value or the nominal value depending on the statistics calculated.

3.6.1 Market Value Weighting

The market value weights for the bonds included in the index can be divided into two groups, the first is the monthly market value weight as defined in (2) and the other being a daily market value weight that reflects the exposure of the index intra month:

$$w_{i,t}^{MV} = \frac{MV_{i,t}}{\sum_{i=1}^n MV_{i,t}}, \text{ where } \sum_{i=1}^n w_{i,t}^{MV} = 1 \quad (17)$$

3.6.2 Credit Duration Adjusted Weighting

The credit duration adjusted weighting is each issues market value weight adjusted by its credit duration:

$$w_{i,t}^{CD} = \frac{CD_{i,t} \times MV_{i,t}}{\sum_{i=1}^n CD_{i,t} \times MV_{i,t}}, \text{ where } \sum_{i=1}^n w_{i,t}^{CD} = 1 \quad (18)$$

3.7 Key Ratios

This section will explain how all index key ratios are weighted. Important to note is the treatment of defaulted securities. Following such an announcement of default, all key-ratios for the relevant security will immediately be set to zero. In instances where no spread or yield can be calculated the bond will not be included in the averaged key ratio, and thus the denominator in the following subsections will be adjusted accordingly.

3.7.1 Average Modified Duration

The index' weighted modified duration is the market value weighted sum of the constituents modified duration $MD_{i,t}$:

$$IMD_t = \left(\sum_{i=1}^n MD_{i,t} \times w_{i,t}^{MV} \right) \times (1 - \text{share of cash}) \quad (19)$$

3.7.2 Average Credit Duration

The index' weighted credit duration is the market value weighted sum of the constituents credit duration $CD_{i,t}$:

$$ICD_t = \left(\sum_{i=1}^n CD_{i,t} \times w_{i,t}^{MV} \right) \times (1 - \text{share of cash}) \quad (20)$$

3.7.3 Index Spread

The index' weighted average spread is the credit duration adjusted weighted sum of the constituents spread $S_{i,t}$ over 3-month NIBOR:

$$IS_t = \left(\sum_{i=1}^n S_{i,t} \times w_{i,t}^{CD} \right) \times (1 - \text{share of cash}) \quad (21)$$

3.7.4 Average Yield

The index' weighted average yield to maturity is the credit duration adjusted value weighted sum of the constituents yield to maturity $Y_{i,t}$:

$$IY_t = \left(\sum_{i=1}^n Y_{i,t} \times w_{i,t}^{CD} \right) \times (1 - \text{share of cash}) \quad (22)$$

4 Additional Information

4.1 Index Reviews

To ensure the relevance and stability of the indices, all rules noted in this document will be subject to a full review once a year. Amendments will be communicated to registered subscribers of the indices.

4.2 Contact Information

Visiting address:

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Notes

¹When an scheduled payment (interest payment or installment) is not made as agreed or the issuer has notified that it will not make the payment, the bond is marked as *non-payment*. When formal insolvency proceedings have been initiated the bond is marked as *insolvent*. When a final notice of default has delivered, the bond is marked as *defaulted*

²The expected maturity depends on a number of criteria. If the security is early redeemed, that date will used as the maturity date. For Subordinated and Hybrid Financials the first call date will in general be the expected maturity date. In most other cases the expected maturity is the contractual maturity.

³The listing requirement does not include securities issued by a Norwegian municipality

⁴Except for bonds not officially declared as in default, if there are information available in the market indicating so then accrued interest will continue to be attributed to the specific bond until new information is provided.

⁵All scheduled coupon payments post default date will be set to zero, but if any coupon payment was made post rebalancing date and prior to default date it will be included into the coupon return as a positive return.

Appendices

A Accepted Currencies High Yield

- NOK
- DKK
- GBP
- SEK
- USD
- EUR

B Definition of Regular and High Yield Market

The segregation between the Regular Market and High Yield Market is done in accordance with the principles outlined in this appendix. The Regular and the High Yield Markets are separated based on the price level of the constituents. The segregation of the two main groups will in general be based on price level in terms of a credit spread for each constituent and relative to a reference curve as defined for the various tiers of securities as communicated by NBP.

NBP may seek information and advice among market participants regarding the assessment of one or several constituents. NBP will make the decision based on own sole discretion, in accordance with the principles as outlined here. The principles will be subject to changes based on decisions made, and communicated, by NBP.

Bonds with equal seniority will in general be treated in the same manner for each Issuer. Price level for instruments with an expected maturity in 2.5 to 5.5 years will usually be given more weight in the assessment⁶. Instruments with a short time or very long time to maturity will usually be given less weight. The assessment may emphasize and adjust for specific characteristics with the current supply/demand situation in the market⁷.

In order to avoid frequently reclassifications based on short-time volatility a safety barrier of 15 per cent of the benchmark level will be added to the benchmark level when considering a reclassification to High Yield, and similar 15 per cent of the benchmark level will be subtracted from the benchmark level when considering reclassification to Regular Market. If the constituents reside within the safety barrier for two consecutive months reclassification should be expected to be effective. If there are clear indications that the price shift is of not temporary nature, i.e. when the price level exceeds the safety barrier in a single month, the shift will be effective immediately.

B.0.1 Covered Bonds Regular Market

The benchmark for the Covered Bond Regular Market will be the NBP curve *Covered Residential 6* plus a spread of 30 basis points. All covered bonds with a spread level within this range will qualify for inclusion into the Covered Bond Regular Market.

B.0.2 Senior Bonds Financials Regular Market

The benchmark for the Senior Bonds Financials Regular Market will be the NBP curve *Bank 8* plus a spread of 50 basis points. All senior bonds with a spread level within this range and with affiliation to the financial sector will qualify for inclusion into the Senior Bonds Financials Regular Market.

The benchmark for the Senior Non-Preferred Bonds Financials Regular Market will be Senior Unsecured Bonds Financials Regular Market with the addition of the basis point spread between senior non-preferred bonds and senior unsecured bonds for benchmark issuers. All senior non-preferred bonds with a spread level within this range and with affiliation to the financial sector will qualify for inclusion into the Senior Bonds Financials Regular Market

B.0.3 Senior Bonds ex Financials Regular Market

The benchmark for the Senior Bonds ex Financials Regular Market will be the NBP curve *Senior Non-Financials BBB- Composite* with the addition of a spread of 10 basis points. All senior bonds with a spread level within this range and without any affiliation to the financial sector will qualify for inclusion into the Senior Bonds ex Financials Regular Market⁸.

B.0.4 Subordinated Financials Regular Market

The benchmark for the Subordinated Bonds Financials Regular Market will be the NBP curve *Ansvarlig lån 8*. All subordinated bonds with a spread level within this range and with affiliation to the financial sector will qualify for inclusion into the Subordinated Financials Regular Market.

B.0.5 Hybrid Financials Regular Market

The benchmark for the Hybrid Financials Regular Market will be the NBP curve *Fondsobligasjoner 2*. All hybrid bonds with a spread level within this range and with affiliation to the financial sector will qualify for inclusion into the Hybrid Bonds Regular Market.

B.0.6 High Yield

All bonds that do not fall within the spread range as defined for their respective security classifications will be defined as High Yield bonds.

B.0.7 Amendments to the definitions

Based on shifting market conditions, NBP may decide to adjust benchmark levels. NBP may also decide to add or adjust the different tiers in order to make the definitions relevant to the universe of constituents from time to time. Such decisions will be duly communicated to registered subscribers of the indices.

C Duration Target Indices

The object of this section is to present an in-detail description of the duration target indices. A duration targeted index will at each rebalancing date fix a set of weights such that the weighted modified duration (hereinafter referred to as simply duration) equals the index targets of 0.25 (3M), 0.5 (6M), 1, 3 and 5.

The matrix in figure 5 depicts the full set of sector specific RM duration targeted indices that NBP will provide (framed by the red line),¹² based on combinations of Regular Market (RM) groups and duration targets 1, 3 and 5. In addition, 6 sector compound duration target indices will be available, with the compound sectors RM1/RM2 and RM1/RM2/RM3 and duration targets 1, 3 and 5 (not shown in figure 5).

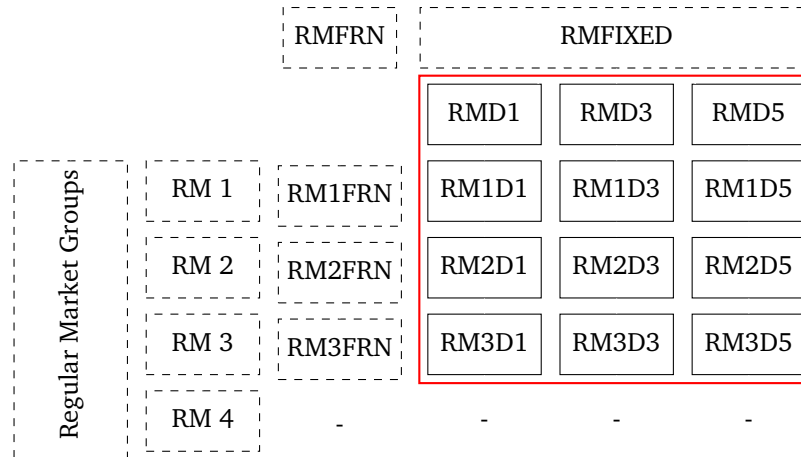


Figure 5: Full set of sector specific duration targeted regular market indices (in red).

The matrix in figure 6 depicts the set of government duration targeted indices NBP will provide (framed by a red line). NBP will offer five duration targets indices with duration targets between 0.25 and 5.

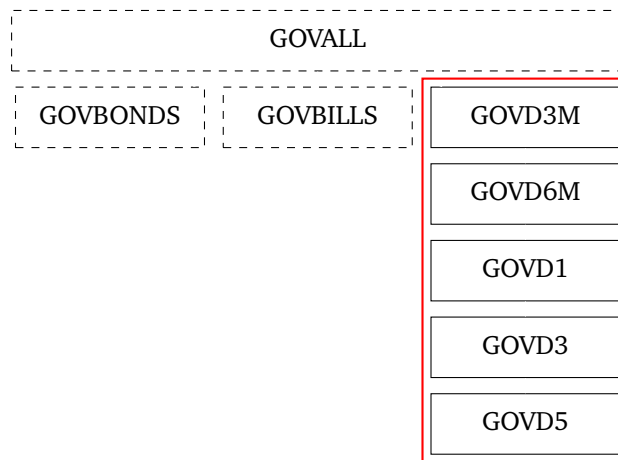


Figure 6: Full set of duration targeted government indices (in red).

All indices with duration targets consists of only fixed rate and zero-coupon issues and are weighted according to the following methodology:

1. The index constituents are either selected from the aggregated fixed interest constituents for the aggregated duration indices or divided into their respective Regular Market group.
2. In order to ensure that the constituents of the duration targeted indices are representative, the following rules applies to the range of eligible issues:

Duration target 0.25: Include exclusively issues with a modified duration below 0.875

Duration target 0.5: Include exclusively issues with a modified duration below 1.25

Duration target 1: Include exclusively issues with a modified duration below 3

Duration target 3: Include exclusively issues with more than a year to maturity and a modified duration below 8

Duration target 5: Include exclusively issues with a more than a year to maturity

Allowing the full set of constituents into all duration targeted indices would result in adjusted weights which markedly deviates from its market value weight, hence the narrowing of the assortment of bonds.

3. The eligible issues in the various indices are then divided into two portfolios, portfolio 1 (P1) includes all issues with a modified duration lower than the target duration (D_{target}) and portfolio 2 (P2) includes all issues with a modified duration higher than the target duration of the index.
4. Market value weights within each of the two portfolios is calculated, so that the weight of bond i in portfolio P1 or P2 is given as:

$$w_i^{P1} = \frac{MV_{i \in P1}}{\sum_{i=1}^n MV_{i \in P1}}, \quad \text{where } D_i < D_{\text{target}} \quad \text{and} \quad \sum_{i=1}^n w_i^{P1} = 1 \quad (23)$$

$$w_i^{P2} = \frac{MV_{i \in P2}}{\sum_{i=1}^n MV_{i \in P2}}, \quad \text{where } D_i \geq D_{\text{target}} \quad \text{and} \quad \sum_{i=1}^n w_i^{P2} = 1 \quad (24)$$

5. Based on the weights calculated in step 4 the weighted duration of the two portfolios are calculated (D^{P1} and D^{P2}). Based on these weighted durations an adjustment factor x_1 can be solved for in the following set of equations:

$$D^{\text{target}} = D^{P1} \times x_1 + D^{P2} \times x_2, \quad \text{where } x_1 + x_2 = 1 \quad \text{and} \quad x_1, x_2 \geq 0 \quad (25)$$

Solving this with respect to x_1 :

$$x_1 = \frac{D^{P2} - D^{\text{target}}}{D^{P2} - D^{P1}} \quad (26)$$

6. Each market value weight in P1 is then multiplied by x_1 and in P2 by x_2 , such that the final index weight is given by $w_i = w_i^{Pj} \times x_j$ where $i = 1, \dots, n$ and $j = 1, 2$.

The weights are held constant throughout the month such that the daily weighted average duration will be given by

$$D_t = \sum_{i=1}^n w_i \times D_{i,t} \quad (27)$$

The duration of floating rate notes (FRNs) the duration is piecewise declining in time; the duration is declining until the next fixing date where it is reset to the length of the fixing period. For fixed interest bonds on the other hand, the duration should be expected to decline over time. To allow for this drifting effect and keeping the average duration within a month equal to the target, an addendum (ϵ) is added to the duration target D^{target} . This applies for all duration targets.

Special circumstances

As the markets which the duration targeted indices are based on are not static across time, some special events may arise when the issued volume in various market segments change. The duration target indices require a minimum of two bonds for the methodology described above to be applicable, one on each side of the duration target. This illustrates an event where the fixed duration may not be maintained. The handling of such an event is outlined in the final bullet point in section 2.5. As for duration target 0.25, only one security may be eligible (given the condition on minimum one month to maturity at rebalancing date). In this event the index may consist of only one security for the actual period with a weight of 100 % and the duration of the index will be equal to the actual security's duration in that particular period.

D Changes to NBP index methodology

D.1 August 2018

D.1.1 Added limitation to issue date to section 1.2.

D.1.2 Added description for accrued interest calculations to section 1.4.

D.2 Mars 2019

D.2.1 Added benchmark for Senior Non-Preferred Bonds in appendix B.0.2.

D.2.2 Corrected last sentence in fourth section in in appendix B by adding ", the shift will be effective immediately".

D.3 May 2020

D.3.1 Changed benchmark for Senior Bonds ex Financials Regular Market to "*Senior Non-Financials BBB- Composite* with the addition of a spread of 10 basis points" in appendix B.0.3.

D.4 November 2020

D.4.1 The description of NBP index family in section 1.1 was changed to allow for government bond indices.

D.4.2 Sections 1.1.3 and 1.2.3 were added due to inclusion of government bond indices in NBP index family.

D.4.3 Appendix C was changed to allow for duration targets 0.25 and 0.5 and for inclusion of zero-coupon treasury bills in duration target indices.

Notes

⁶If an issuer has multiple active issues with a remaining time to maturity between 2.5 and 5.5 years, the issues in this segment will be weighted based on the product of each issues market value and it's time to maturity. On the other hand, if an issuer with multiple issues within a seniority class with time to maturity lower and higher than the segment (2.5,5.5), these issues will also be weighted according to time to maturity and market value. The last possible case is when an issuer has one issue within the interval 2.5 and 5.5 years, and multiple issues outside the interval, then the one issue with a time to maturity between 2.5 and 5.5 years will be deceive for the issuer classification

⁷NBP reserves the right to overrule a reclassification in instances where the reclassification is an obvious case of pricing and/or market imperfection.

⁸This does not include Norwegian counties and municipalities, which will be classified as RM.

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