Nordic Bond Pricing

Index Methodology

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1 Index Description

The Nordic Bond Pricing (NBP) Index families are composed of bonds registered in Nordic CDSs; Euronext Securities Oslo, Euroclear Sweden, Euronext Securities Copenhagen, Euroclear Finland. In addition, Nordic domiciled issuers where bonds are registered in Euroclear (XS-ISINs) may be included. The indices are created to offer fixed income investors independent benchmarks to evaluate the performances of their portfolios. The Index families are constructed to meet different needs of market participants; thus, it aims to measure underlying bond markets, in aggregate or based on more specific investment mandates.

The main goal is to offer indices for the Nordic fixed income markets where the issuers are based in the Nordics. There are no restrictions on domicile on Nordic ISIN's (DK, FI, NO and SE), however, issuers of XS-ISINs (Euroclear CDS) are restricted to Nordic domiciles to keep the Nordic scope.

The fundamental philosophy behind the indices is as follows:

- Transparent and objective rules, to provide constituents eligible for inclusion or exclusion from the indices.
- The eligibility rules aim at investable and replicable indices, providing credible return benchmarks.
- Hierarchical structure of the index family.

The purpose of this publication is to provide index users with the philosophy behind the creation of these indices, their construction and 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 an NBP index family. Current indices cover Government market (GOV), High Yield market (HY) and Regular Market (RM). Regular Market is equivalent to "Investment Grade". This section will describe the NBP indices for all markets. Classification of Regular Market and High Yield Market is done in accordance with the principles as outlined in Appendix B. The classification of constituents is based on credit rating issued by rating agencies, or, in the absence of credit rating, the price levels of the constituents indicated by a credit spread relative to a reference curve, as defined by NBP, for various tiers of securities.

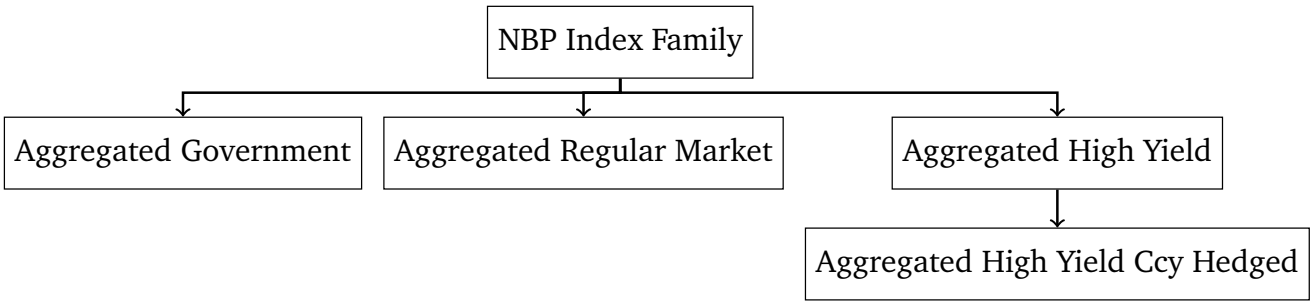

Figure 1: NBP Index Family

1.1.1 Regular Market

The Regular Market branch of the index family consists of single currency aggregate indices, which contain all eligible bonds in the Regular Market universe denominated in the specified currency. Inclusion in the Regular Market is defined in Appendix B. Interest type, Regular Market sub-groups, duration, or other characteristics may be used to create (single currency) subindices based on the universe of securities in the aggregate RM-index.

SEK Regular Market
SEK Aggregate Regular Market Index consists of SEK denominated securities fulfilling eligibility rules as defined in sections 1.2 and 1.2.2.

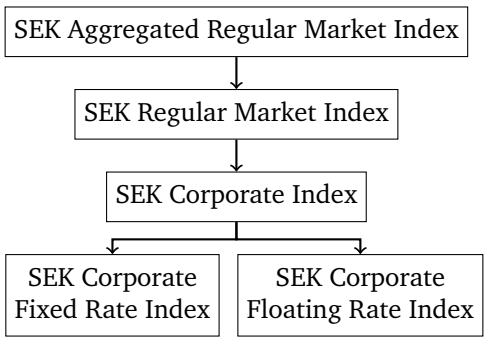

Figure 2: SEK Regular Market Branch

SEK Regular Market Index
SEK Regular Market Index has minimum nominal amount outstanding of SEK 500 million and expected time to maturity will be at least one year at the end of an index period.

SEK Corporate Sub-Indices
The index will contain financials (senior unsecured and subordinated) and senior secured and unsecured non-financial companies. In addition, two sub-indices with fixed or floating rate bonds respectively will be published as well. All indices will have minimum nominal amount outstanding of SEK 500 million and expected time to maturity will be at least one year at the end of an index period.

NOK Regular Market
The NOK Regular Market aggregate index consists of NOK denominated securities fulfilling eligibility rules as defined in sections 1.2 and 1.2.1.

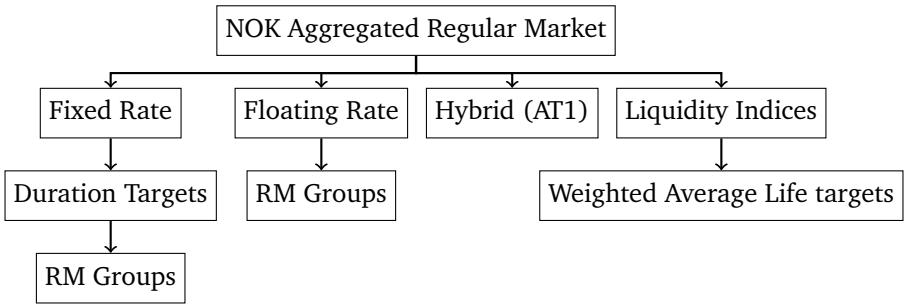

Figure 3: NOK Regular Market Branch

NOK Regular Market Fixed Interest Sub-Indices
First level of fixed interest type sub-indices will be an index of all issues having a fixed rate. Three duration targeted indices will constitute the second level of sub-indices, having duration targets of 1, 3 and 5. The next and third level of subindices will be duration targets (of 1, 3 and 5) by RM Groups (1 2 and 3), defined in section 1.5.2. Details on the duration target methodology and the complete set of sub-indices can be found in Appendix C and figure 6.

NOK Regular Market Floating Interest Sub-Indices
First level of floating rate sub-indices will be an index of all floating rate notes. Floating rate notes by RM Groups will constitute the second level of sub-indices, excluding RM 4 (Additional Tier 1 issues). See Appendix C, figure 6 for complete list of subindices.

NOK Regular Market Liquidity Sub-Indices
Liquidity indices are low interest rate risk indices, i.e., securities with a maximum of one year interest rate fixing period. The indices are set out to comply with 'Liquidity Fund' rules as outlined in VFF document 'Bransjestandard for informasjon og klassifisering av rentefond'[1] as of June 6th, 2021 (hereafter referred to as 'VFF Standard'). The indices comply with the VFF Standard by a set of rules making the indices as representative to a Liquidity Fund portfolio as possible within the boundaries of a fixed income security index. One predominant rule is a Weighted Average Life ('WAL') target. Details on Liquidity Indices and WAL target methodology can be found in Appendix D.

NOK Regular Market Additional Tier 1 Sub-Index
An index consisting of Additional Tier 1 bonds (hybrid bonds). The index has no other criteria than the standard eligibility rules.

1.1.2 High Yield market

The high yield branch of the index family consists of an aggregate index, containing all eligible bonds in the high yield universe. Constituents have either DK, FI, NO or SE-ISIN and are denominated in the currencies specified in appendix A. Three sub-indices are available: An index where Oil & Gas issuers are excluded, NO-ISIN only index and SE-ISIN only index. As constituents have multiple currencies, the indices are available as both hedged and unhedged with regard to currency return effects. Base currencies are NOK or SEK, however, other base currencies are optional for a limited selection of currencies. The currency hedge is set to the chosen base currency[2].

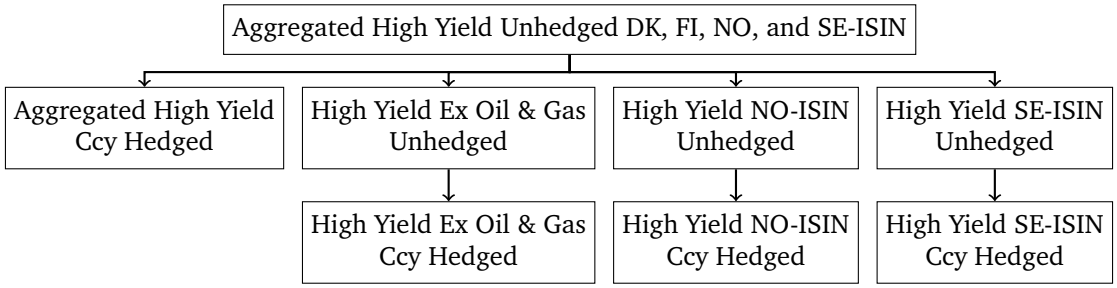

Figure 4: High Yield Branch

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. Three branches of sub-indices are published: A treasury bond index, a treasury bill index and five duration targeted indices. Duration target indices have modified duration targets of 0.25, 0.5, 1, 3 and 5. Details on the duration target methodology can be found in appendix C.

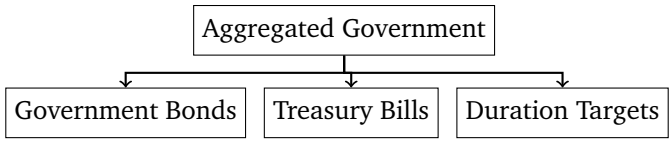

Figure 5: Government Market Branch

1.2 Eligibility Rules

The NBP Bond Indices are total return indices, based on eligibility rules 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 'DK', 'FI', 'NO', 'SE' or 'XS'. For XS-ISIN the issuer of a bond must be domiciled in a Nordic country.
- No convertible bonds are included.
- Both floating and fixed rate instruments are eligible.
- At the rebalancing date, with reference to the amount registered by Stamdata, a security's principal, in its denominated currency, must have an outstanding nominal amount of minimum:
  - DKK 200 million, or
  - EUR 30 million, or
  - GBP 25 million, or
  - NOK 300 million, or
  - SEK 300 million, or
  - USD 30 million.

  The principal minimum levels will be subject to changes based on decisions made and communicated by NBP.
- The securities are listed or are applying for listing on a regulated marketplace, multilateral trading facility, organised trading facility or marketplace/trading facility accepted by market participants. In cases where the listing process on each rebalancing date exceeds thirteen months, the relevant security will be excluded. Listed securities ensure access to relevant information and are assumed to be available to a wide range of investors[3].
- Securities declared to be in default or in insolvency proceedings[4] 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.
- Several 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 NOK Regular Market Indices

Securities eligible for inclusion in the NOK Regular Market universe must be NO-ISIN and denominated in NOK. Only bonds with bullet redemption and at least one month to expected maturity[5] 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 covered, hybrid and subordinated bonds, only bonds without options are eligible. Securities issued or guaranteed by OECD sovereigns are excluded.

1.2.2 Specific Rules for SEK Regular Market Indices

Securities eligible for inclusion in the SEK Regular Market universe must be denominated in SEK and have a credit rating with grade «Baa3/BBB-» or above. A security without rating may be included if the Issuer is rated with grade «Baa3/BBB-» or above. If an issuer or security has multiple ratings, the second best rating will be used. Credit ratings must be assigned by credit rating agencies registered or certified by the European Securities and Market Authority (ESMA).

A security must have bullet redemption and at least one month to expected maturity[5] at the rebalancing date to be included. Embedded optionality in the form of call/put options are allowed.

1.2.3 Specific Rules for SEK Regular Market Sub-Indices

In addition to rules in 1.2.2 except expected maturity rule, SEK Regular Market Sub-indices will have a minimum nominal amount of SEK 500 million at Rebalancing Date and at least one year to maturity at the end of a period. Bonds issued by Sovereigns, Supranationals and Agencies (SSA)[6] are not allowed in SEK Corporate Sub-Indices.

1.2.4 Specific Rules for High Yield Indices

Securities eligible for inclusion in the High Yield universe are allowed to be denominated in the currencies as 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.

1.2.5 Specific Rules for NOK 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.

1.2.6 Specific Rules for NOK Liquidity Indices with Low Risk

Securities eligible for inclusion in Liquidity Indices with low risk follow the rules laid out for Regular Market Indices. In addition, the following rules apply to comply with eligibility rules laid out for 'Liquidity fund with low risk' in section 3.3.1. in the VFF standard:

- Fixed-rate securities shall have a maximum maturity of 365 + 14 calendar days.

- Floating-rate securities shall have a maximum maturity of 3 years + 14 calendar days.
- Subordinated and senior non-preferred issues are excluded from the index.
- Securities in the index must have minimum «AA-/Aa3» rating except for securities issued by banks or financial institutions which must have minimum «BBB-/Baa3» rating or be classified as RM2. Bonds issued by Norwegian municipalities or local government are considered as «AA/Aa2» rated securities.

Rules affecting constituent weights for indices that comply with 'Liquidity fund with low risk':

- The weighted average time to maturity (WAL) shall be maximum 1 year.
- Floating rate securities maturing between 365 + 14 calendar days and 3 years + 14 calendar days shall not exceed 25% Market Value weight at rebalancing date.

Weighting rules are described in detail in appendix D.

1.2.7 Specific Rules for NOK Liquidity Indices Standard

Securities eligible for inclusion in Liquidity Indices follow the rules laid out for Regular Market Indices. In addition, the following rules apply to comply with eligibility rules laid out for 'Liquidity fund' in section 3.3.2. in the VFF standard:

- Fixed-rate securities shall have a maximum maturity of 365 + 14 calendar days.
- The issuer or the security must have minimum «BBB-/Baa3» rating ("Investment Grade") or be classified as Regular Market. For issuers of subordinated debt, rating must be at least «BBB+/Baa1» or, if rating is not available, the security must be classified as Regular Market.
- Perpetual subordinated issues are excluded from the index. This is done by capping the time to maturity on floating rate securities at thirty years. This rule is not in the VFF Standard but has been added by NBP to keep the WAL concept consistent.

Rules affecting constituent weights for indices that comply with 'Liquidity fund':

- Weighted modified duration shall be below 1.
- Weighted Average Life ("WAL") shall be maximum 1.5 years.
- Subordinated issues can have a share of a maximum of 10% of the index's market value at rebalancing date.

Weighting rules are described in detail in appendix D.

1.2.8 Specific Rules for NOK and SEK Regular Market Indices

Securities in NOK and SEK Regular Market Indices are included according to the rules in sections 1.2.1 and 1.2.2 for NOK and SEK denominated securities respectively. Currency hedge is set to the chosen base currency.

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 or, alternatively, the coupon payment convention (paid over) following from the Recommended Conventions for the Norwegian Certificate and Bond Markets (Finance Society Norway)[7] or similar publications for relevant markets.

1.5 Classifications

1.5.1 Security Classification

The classification of securities eligible for NOK Government indices and NOK Regular Market indices will be based on seniority in the issuer's capital structure and sector. NBP classifies the securities into the following groups:

- Government debt,
- Debt issued by local government and covered bonds,
- Senior debt issued by financial institutions,
- Senior debt issued by corporates and subordinated debt issued by financial institutions, and
- Hybrid debt issued by financial institutions.

Bullet points 2 - 5 above is the basis for the classification of Regular Market Groups 1- 4 as defined in 1.5.2.

1.5.2 Regular Market Groups

Regular Market Group 1 (RM1)
The Regular Market Group 1 consists of bonds issued by all Norwegian counties and municipalities and covered bonds. Covered bonds will be included in accordance with the *Covered Bonds Regular Market* definition as set out in Appendix B. In addition, senior unsecured debt issued by Kommunalbanken AS is defined as The Regular Market Group 1.

Regular Market Group 2 (RM2)
Senior bonds issued by financial institutions will be included in the Regular Market Group 2 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[8]. Subordinated bonds (Tier 2) issued by financial institutions will be included in RM3 in accordance with the *Subordinated Financials Regular Market* definition as set out in Appendix B.

Regular Market Group 4 (RM4)
Hybrid bonds (Additional Tier 1) issued by financial institutions will be included in RM4 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 Norwegian Government, denominated in NOK.

1.6 Holiday Convention

All NBP indices will be published on all dates where at least one market in the total NBP Index Family (see section 1.1 and subsections) has a regular business day. This means that when a market in at least one index is open, index values for all indices will be published, even if the market/all markets in a given index are closed[9]. For constituents whose markets are on holiday, prices from previous business day are used. Last available FX rates will be used in the index value calculations.

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. 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 outlined in this section and in section 1.2 will constitute the maximum number of eligible issues on the rebalancing date. This means that no new bonds may be added to the list of constituents after the 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 minimum nominal outstanding amount will be assessed for securities which have been affected by corporate actions. 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

Index base dates (index value = 100):

- All NO-ISIN (Government, Regular Market and High Yield) indices: December 31st 2014.
- Nordic High Yield Indices: December 31st 2021.
- SEK Regular Market Indices: September 30th 2023.
- NOK and SEK Regular Market Indices: September 30th 2023.

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 ensure that its indices are free from errors. However, errors may occasionally occur due to inaccurate pricing data or incorrect reference information. In cases where an error has a significant impact on daily or monthly index values, either at the aggregate or sector level, a restatement may be warranted. NBP reserves the right to recalculate the affected indices in such cases and will notify affected clients accordingly. Minor errors in constituent-level return calculations, for example due to incomplete information about corporate actions, may also occur. Once identified and confirmed, such errors will be corrected by offsetting the impact of the erroneous calculations.

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 exists 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.

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

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

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

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.

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

where $q = 1, ..., Q_i$ 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.

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

In the function above, $b_{i,t}$ denotes the share of a coupon payment $C_{i,t}$ that is settled in cash. $\mathrm{N}_{i,t-s}$ is the notional amount outstanding at the last rebalancing date and $\mathrm{N}_{i,q,t}$ is the amount redeemed for corporate action number q at date t. P denotes the clean price, AI the accrued interest and $\mathrm{AI}_{i,q,\text{settle}}$ 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 $\mathrm{P}_{i,q,r}$ and coupon payments made post settlement of redemption, on date m, is denoted as $\mathrm{C}_{i,m}$. $\mathrm{K}_{i,q}$ 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 $\mathrm{K}_{i,q}$ and the clean price $\mathrm{P}_{i,q,r}$ 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 ($\mathrm{TR}_t^{\mathrm{LC}}$) in local currency.

$$
\mathrm{IV}_t^{\mathrm{LC}} = \mathrm{IV}_{t-s}^{\mathrm{LC}} \times \left(1 + \mathrm{TR}_t^{\mathrm{LC}}\right) \tag{4}
$$

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:

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

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

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

A bond that does not have a PIK status at the beginning of the month will change status if a formal approval of such a change to the terms of the bond has been approved or if 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:

$$\begin{aligned} \text{TR}^{\text{LC}}_{i,t} = & \underbrace{\frac{\text{P}_{i,t} - \text{P}_{i,t-s}}{\text{P}_{i,t-s} + \text{PIK adj}_{i,t-s} \times \text{AI}_{i,t-s}}}_{\text{Price Return}_{i,t}} + \underbrace{\frac{\text{PIK adj}_{i,t} \times \text{AI}_{i,t} - \text{PIK adj}_{i,t} \times \text{AI}_{i,t-s} + b_{i,t} \times \text{C}_{i,t}}{\text{P}_{i,t-s} + \text{PIK adj}_{i,t-s} \times \text{AI}_{i,t-s}}}_{\text{Coupon Return}_{i,t}} \\ & + \alpha_{i,t} \Bigg[\underbrace{\frac{-\text{P}_{i,r}}{\text{P}_{i,t-s} + \text{PIK adj}_{i,t-s} \times \text{AI}_{i,t-s}}}_{\text{Redemption Return}_{i,t}} + \underbrace{\frac{(\text{P}_{i,r} + \text{PIK adj}_{i,r} \times \text{AI}_{i,\text{settle}}) - (\text{P}_{i,t} + \text{PIK adj}_{i,t} \times \text{AI}_{i,t})}{\text{P}_{i,t-s} + \text{PIK adj}_{i,t-s} \times \text{AI}_{i,t-s}}}_{\text{Paydown Return}_{i,t}} \Bigg] \end{aligned} \tag{5}$$

where $b_{i,t} \times \text{C}_{i,t}$ 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 enter the index as PIK bonds at the beginning of the month will have $\text{PIK adj}_{i,t-s} = \text{P}_{i,t-s}/100$ 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 PIK 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.

$$\text{Adjusted coupon return} = \frac{\text{AI}_{i,\text{settle}} - \text{AI}_{i,t-s} + \text{C}_{i,\text{settle}}}{\text{P}_{i,t-s} + \text{AI}_{i,t-s}} \tag{6}$$

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 ($\text{AI}_{i,t} = 0$ and $\text{C}_{i,t} = 0$)[10]. This will result in a negative coupon return for the defaulted security throughout the month[11]. The price return, as defined in (3) remains unchanged while the coupon return can be rewritten as:

$$\text{Adjusted coupon return} = \frac{0 - \text{AI}_{i,t-s} \times \text{PIK adj}_{i,t-s}}{\text{P}_{i,t-s} + \text{AI}_{i,t-s} \times \text{PIK adj}_{i,t-s}} \tag{7}$$

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 $\text{AI}_{i,t} = 0$.

$$\text{Adjusted coupon return} = \frac{0 - \text{AI}_{i,t-s} + \text{C}_{i,t}}{\text{P}_{i,t-s} + \text{AI}_{i,t-s}} \tag{8}$$

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 ($\text{TR}^{\text{BC, UH}}$) on bond i, denominated in currency j, can be expressed as follows:

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

where $\text{TR}^{\text{LC}}_{(i,j,t)}$ 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. $\text{FX}^{\text{LC/BC}}_{j,t-s}$ and $\text{FX}^{\text{LC/BC}}_{j,t}$ 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:

$$\text{TR}^{\text{BC, UH}}_{t} = \sum_{j=1}^{J} \sum_{i=1}^{n} w^{\text{MV}}_{i,j,t-s} \times \text{TR}^{\text{BC, UH}}_{i,j,t} \tag{10}$$

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

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

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 is 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:

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

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:

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

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:

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

where $\text{FWD}_{j,t,1\text{M}}^{\text{LC/BC}}$ 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:

$$\text{TR}_t^{\text{BC, H}} = \sum_{j=1}^{J} \sum_{i=1}^{n} w_{i,j,t-s}^{\text{MV}} \times \text{TR}_{i,j,t}^{\text{BC, H}} \tag{15}$$

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

$$\text{IV}_t^{\text{BC, H}} = \text{IV}_{t-s}^{\text{BC, H}} \times \left(1 + \text{TR}_t^{\text{BC, H}}\right) \tag{16}$$

3.6 Weighting

All return calculations are based on monthly weights, fixed on the last rebalancing date $t - s$. 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:

$$w_{i,t}^{\text{MV}} = \frac{\text{MV}_{i,t}}{\sum_{i=1}^{n} \text{MV}_{i,t}}, \text{ where } \sum_{i=1}^{n} w_{i,t}^{\text{MV}} = 1 \tag{17}$$

3.6.2 Credit Duration Adjusted Weighting

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

$$w_{i,t}^{\text{CD}} = \frac{\text{CD}_{i,t} \times \text{MV}_{i,t}}{\sum_{i=1}^{n} \text{CD}_{i,t} \times \text{MV}_{i,t}}, \text{ where } \sum_{i=1}^{n} w_{i,t}^{\text{CD}} = 1 \tag{18}$$

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 $\text{MD}_{i,t}$:

$$\text{IMD}_t = \left(\sum_{i=1}^{n} \text{MD}_{i,t} \times w_{i,t}^{\text{MV}} \right) \times (1 - \text{share of cash}) \tag{19}$$

3.7.2 Average Credit Duration

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

$$\text{ICD}_t = \left(\sum_{i=1}^{n} \text{CD}_{i,t} \times w_{i,t}^{\text{MV}} \right) \times (1 - \text{share of cash}) \tag{20}$$

3.7.3 Index Spread

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

$$\text{IS}_t = \left(\sum_{i=1}^{n} \text{S}_{i,t} \times w_{i,t}^{\text{CD}} \right) \times (1 - \text{share of cash}) \tag{21}$$

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 $\text{Y}_{i,t}$:

$$\text{IY}_t = \left(\sum_{i=1}^{n} \text{Y}_{i,t} \times w_{i,t}^{\text{CD}} \right) \times (1 - \text{share of cash}) \tag{22}$$

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

[1]https://vff.no/storage/Bransjestandard-for-informasjon-og-klassifisering-av-rentefond-vedtatt-24.6.2021.pdf.

[2]Currency hedges do not remove all currency risk and an index' performance will divert between different base currencies due to currency weights of constituents and carry of the hedges.

[3]The listing requirement does not include securities issued by a Norwegian government or municipality.

[4]When a 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*

[5]The expected maturity depends of several criteria. If the security is early redeemed, that date will be 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.

[6]SSA issuers are among others Kommunalbanken AS (NO), Svensk Eksportkredit AB (SE), Kommuninvest i Sverige AB (SE), Municipailty Finance PLC (FI), Finnvera PLC (FI) and KommuneKredit A/S (DK).

[7]https://finansfag.no/wp-content/uploads/2020/10/NFF_Convntions_Certificate_Bond_Markets_February_2020.pdf.

[8]Bonds issued by non-financial companies which rank lower than senior debt issues (e.g., subordinated corporate debt) will be classified in accordance with *Senior Bonds ex Financials Regular Market* definition as set out in Appendix B. These issues are rare and seldom qualify for inclusion in any index.

[9]Accrued interest will be calculated to include the publishing date.

[10]Except 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.

[11]All 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

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

B Definition of Regular and High Yield Market

Classification of Regular Market and High Yield Market is done in accordance with the principles outlined in this appendix. Regular and High Yield Markets are classified based on issuer or security credit rating or, if credit rating is not available, the price level of the constituents in terms of a credit spread relative to a reference curve as defined for the various classes of securities as communicated by NBP. Only credit ratings issued by credit rating agencies registered or certified by the European Securities and Market Authority (ESMA) can be used. Bonds with equal seniority will in general be given the same classification for each Issuer.

Issuers or securities holding a credit rating «Baa3/BBB-» or above will generally be classified as Regular Market. If an issuer or security has multiple ratings, the second best rating will be used. In cases where the credit spread is significantly above the spread ranges as defined below and a credit rating («Baa3/BBB-» or above) has not been updated or affirmed within a reasonable time frame, NBP will classify the actual bond at its sole discretion. In the classification assessment, a higher credit rating will be given more weight than the credit spread level. Bonds with credit rating equal to or below «BB+/Ba1» will always be classified as High Yield, regardless of credit spread level. If a bond is not classified as High Yield due to credit rating, the actual bond is classified according to section 1.5.2.

When classification is based on credit spread level, instruments with an expected maturity in 2.5 to 5.5 years will usually be given more weight in the assessment[12]. Instruments with a short 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 market[13].

To avoid frequently reclassifications based on short-time volatility in a credit spread level, 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 credit spread shift is of not temporary nature, i.e. when the credit spread level exceeds the safety barrier in a single month, the shift will be effective immediately. In contrast, reclassification due to a change in credit rating will always take place at the next rebalancing date.

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.

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 curves:

- *Senior Non-Financials BBB-/BB+ Composite* with the addition of 20 basis points for NO-ISINs,
- *Senior Non-Financials BBB-/BB+ Industry (SWE)* with the addition of 20 basis points for Senior Non-Financials ex Real Estate for FI, DK and SE-ISINs, and
- *Senior Non-Financials BBB-/BB+ Real Estate (SWE)* with the addition of 20 basis points for Senior Non-Financials Real Estate for FI, DK and SE-ISINs.

All senior bonds with a spread level within the respective ranges and without any affiliation to the financial sector will qualify for inclusion into the Senior Bonds ex Financials Regular Market[14]. For SE-ISINs, the classification will be based on the respective sector curves for industry and real estate.

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 holding a credit rating «BB+/Ba1» or below, or that do not fall within the spread range as defined for their respective security classifications will be classified as High Yield bonds.

The following exceptions apply to SE-ISINs:

- All covered and municipal bonds are not eligible for a high yield index.
- All senior financial bonds are classified utilizing the curve *Senior Non-Financials BBB-/BB+ Industry (SWE)* with the addition of 20 basis points. Bonds assigned with credit rating follows the guidelines laid out above.

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 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. Unlike the general index calculation described in section 3 where index constituent weights are market value weights based on total outstanding nominal amount, duration target indices constituent weights are adjusted to equal target modified durations (hereafter referred to as duration) of 0.25 (3M), 0.5 (6M), 1, 3 and 5 respectively. In addition, a duration target 10 index is offered, with NOK and SEK denominated Regular Market constituents.

Regular Market
The matrix in figure 6 depicts the full set of 21 sector specific RM duration targeted indices that NBP provides (framed by the red line), based on combinations of Regular Market (RM) groups and duration targets 1, 3 and 5. In addition, 9 compound sector duration target indices will be available, with the compound sectors RM1/RM2, RM2/RM3 and RM1/RM2/RM3 and duration targets 1, 3 and 5.

Three market value based floating rate notes only indices with the compound sectors RM1/RM2, RM2/RM3 and RM1/RM2/RM3, are published as well.

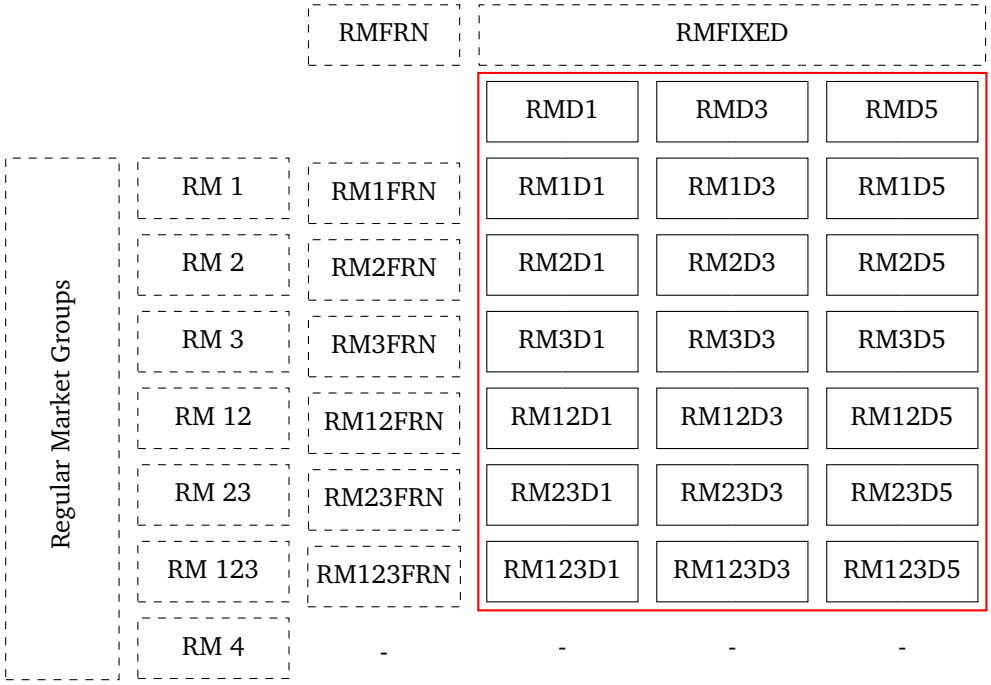

Figure 6: Full set of sector specific duration targeted regular market indices (in red).

Government
The matrix in figure 7 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.

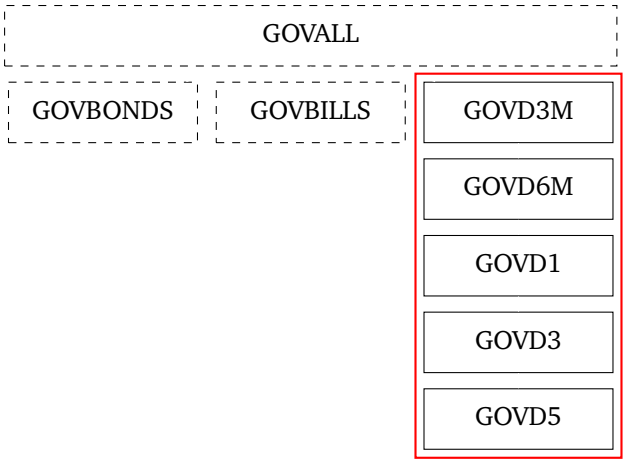

Figure 7: Full set of duration targeted government indices (in red).

All indices with duration targets consist 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. To ensure that constituents in the duration target indices are representative, the following rules apply to the selection 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.
   Duration target 10: Include exclusively issues with a modified duration equal to or above 6.

   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 ($\mathrm{D}^{\mathrm{target}}$) 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 at rebalancing date $t-s$ are calculated, and the weight of bond i in portfolio P1 and P2 is given as:

$$w_{i,t-s}^{P1} = \frac{\mathrm{MV}_{i\in \mathrm{P1},t-s}}{\sum_{i=1}^{n} \mathrm{MV}_{i\in \mathrm{P1},t-s}}, \quad \text{where} \quad \mathrm{D}_{i,t-s} < \mathrm{D}^{\mathrm{target}} \quad \text{and} \quad \sum_{i=1}^{n} w_{i,t-s}^{\mathrm{P1}} = 1 \tag{23}$$

$$w_{i,t-s}^{P2} = \frac{\mathrm{MV}_{i\in \mathrm{P2},t-s}}{\sum_{i=1}^{n} \mathrm{MV}_{i\in \mathrm{P2},t-s}}, \quad \text{where} \quad \mathrm{D}_{i,t-s} >= \mathrm{D}^{\mathrm{target}} \quad \text{and} \quad \sum_{i=1}^{n} w_{i,t-s}^{\mathrm{P2}} = 1 \tag{24}$$

5. The weighted durations of the two portfolios are calculated (D^{P1} and D^{P2}) using the weights calculated in step 4. Given the weighted durations and the target duration ($\mathrm{D}^{\mathrm{target}}$), an adjustment factor x_1 can

be solved in the following set of equations:

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

Solving this with respect to x_1:

$$x_1 = \frac{\mathrm{D}^{\text{P2}} - \mathrm{D}^{\text{target}}}{\mathrm{D}^{\text{P2}} - \mathrm{D}^{\text{P1}}} \tag{26}$$

6. Final index constituent weights are given by $w_{i,t-s} = w_{i,t-s}^{\text{P}_j} \times x_j$ where $i = 1, \ldots, n$ and $j = 1, 2$, where market value weights in P1 is multiplied by x_1 and by x_2 in P2.

For fixed-rate bonds duration is expected to decline over time. To account for this drifting effect and ensure that the average duration over the month remains equal to the target, an addendum (ϵ) is added to the duration target $\mathrm{D}^{\text{target}}$. This applies for all duration target indices.

Special Circumstances for Duration Targeted Indices

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 Weighted Average Life (WAL) Target Indices

The object of this section is to present an in-detail description of the WAL target indices. 'Weighted Average Life' (WAL) is the average length of time unpaid principal on a bond remains outstanding. The WAL of the index is thus the average time until the principals of the underlying securities are repaid. To calculate index WAL the time to maturity for each constituent is multiplied by the corresponding weight.

Using market value weights for all eligible securities, based on total outstanding nominal amount, as constituent weights, index WAL will most likely not equal the target WAL. To equal the target WAL, constituent weights are adjusted by dividing the constituents into two sub-portfolios by the target WAL: Issues with time to maturity equal to or below the target WAL will be in one sub-portfolio and issues with time to maturity above the target WAL will be in put in another sub-portfolio. For each sub-portfolio a factor is calculated, based on the sub-portfolios weighted time to maturity. The sub-portfolio market value weights are multiplied by the corresponding factor to obtain the index constituents' adjusted weights. The adjusted weights will give the target WAL.

When calculating WAL, the VFF Standard specifies that the securities' time to maturity is the final maturity date[15] and, unlike market conventions, this applies for subordinated issues too. Exempt from this rule is covered bonds, where the first call is used as maturity date. It should be noted, however, that the time to maturity rule applies for weighting purposes only, ordinary time to maturity market conventions is used in price and key ratios calculations for index constituents.

D.0.1 WAL Index Low Risk Method

Constituent securities eligible for WAL Index Low Risk are weighted according to the following methodology to meet a specified WAL target:

1. The eligible issues are divided into two sub-portfolios: P1, which includes all issues with time to maturity equal to below the WAL target ($\mathrm{W}^{\text{target}}$) and P2, which includes all issues with time to maturity above the target time to maturity.

   Market value weights within each of the two sub-portfolios at rebalancing date $t-s$ are calculated, and the weight of bond i in the sub-portfolios are:

$$w^{\mathrm{P1}}_{i,t-s} = \frac{\mathrm{MV}_{i\in \mathrm{P1},t-s}}{\sum_{i=1}^{n} \mathrm{MV}_{i\in \mathrm{P1},t-s}}, \quad \text{where} \quad \mathrm{TM}_{i,t-s} <= \mathrm{W}^{\text{target}} \quad \text{and} \quad \sum_{i=1}^{n} w^{\mathrm{P1}}_{i,t-s} = 1 \tag{27}$$

$$w^{\mathrm{P2}}_{i,t-s} = \frac{\mathrm{MV}_{i\in \mathrm{P2},t-s}}{\sum_{i=1}^{n} \mathrm{MV}_{i\in \mathrm{P2},t-s}}, \quad \text{where} \quad \mathrm{TM}_{i,t-s} > \mathrm{W}^{\text{target}} \quad \text{and} \quad \sum_{i=1}^{n} w^{\mathrm{P2}}_{i,t-s} = 1 \tag{28}$$

   $w^{\mathrm{P}_j}_{i,t-s}$ is the market value weight of constituent i in sub-portfolio j at rebalancing date $t-s$, $\mathrm{MV}_{i\in \mathrm{P}_j,t-s}$ is the market value of constituent i in sub-portfolio j at rebalancing date $t-s$ and $\mathrm{TM}_{i,t-s}$ is the time to maturity of constituent i at rebalancing date $t-s$.

2. The WAL of the two sub-portfolios are calculated (W^{P1} and W^{P2}) using the weights calculated in step 1:

$$\mathrm{W}^{\mathrm{P}_j} = \sum_{i=1}^{n} \mathrm{TM}_{i\in \mathrm{P}_j,t-s} \times w^{\mathrm{P}_j}_{i\in \mathrm{P}_j,t-s}, \text{ where } i = 1,\ldots,n \text{ and } j = 1,2 \tag{29}$$

3. Based on the WALs and the target WAL, adjustment factors f_j are given by:

$$\begin{gathered} \mathrm{W}^{\mathrm{P1}} \times f_1 + \mathrm{W}^{\mathrm{P2}} \times f_2 \leq \mathrm{W}^{\text{target}} \\ \text{where } f_1 + f_2 = 1, \\ 0.75 \leq f_1 < 1, \text{ and } 0 < f_2 \leq 0.25 \end{gathered} \tag{30}$$

   The constraint $0 < f_2 \leq 0.25$ reflects the 25% weight limit of floating rate securities maturing between 365 + 14 calendar days and 3 years + 14 calendar days, which are allocated to portfolio P2. Solving for f_2 gives following equation:

$$f_2 = min\left(0.25, \frac{\mathrm{W}^{\mathrm{P1}} - \mathrm{W}^{\text{target}}}{\mathrm{W}^{\mathrm{P1}} - \mathrm{W}^{\mathrm{P2}}}\right) \tag{31}$$

Adjustment factors f_1 and f_2 can be interpreted as weights to P1 and P2 respectively. Each market value weight $w^{\mathrm{P}_j}_{i,t-s}$ in P1 and P2 are multiplied by f_1 and f_2, such that the final index constituent weights are given by:

$$\overline{w}_{i,t-s} = w^{\mathrm{P}_j}_{i,t-s} \times f_j \text{ where } i = 1,\ldots,n \text{ and } j = 1,2. \tag{32}$$

Thus, by combining and rearranging equations (27), (28) and (32), the index' constituents sum to 1: $\sum_{i=1}^{n} \overline{w}_{i,t-s} = 1$. By combining equations (29), (30) and (32) and rearranging, it can be shown that the weighted time to maturity is less than or equal to the target WAL: $\sum_{i=1}^{n} \overline{w}_{i,t-s} \times \mathrm{TM}_{i,t-s} \leq \mathrm{W}^{\text{target}}$.

D.0.2 WAL Index Standard Method

Constituent securities eligible for the WAL Index Standard are weighted according to the following methodology to meet a specified WAL target:

1. Let all subordinated bonds eligible for the index be held in a sub-portfolio S denoted PS. The subordinated issues' share of the index can not exceed 10% of the total index, measured by market value weights at rebalancing date $t-s$:

$$\sum_{i=1}^{n} w_i^{\text{PS}} = min\left(\sum_{i=1}^{n} \frac{\text{MV}_{i\in\text{PS},t-s}}{\sum_{i=1}^{n} \text{MV}_{i,t-s}}, 0.1 \right), \tag{33}$$

where market value weight of subordinated bond i is $w_i^{\text{PS}} = \frac{\text{MV}_{i\in\text{PS},t-s}}{\sum_{i=1}^{n} \text{MV}_{i,t-s}}$.

$\text{MV}_{i,t-s}$ is the market value of constituent i at rebalancing date $t-s$.

An adjustment factor f_{S} is assigned to all subordinated bonds' weights. f_{S} will have one of the values:

$$f_{\text{S}} = \begin{cases} 1, & \text{if } \sum_{i=1}^{n} w_{i,t-s}^{\text{PS}} \leq 0.1 \\ 0.1 \times \left(\sum_{i=1}^{n} w_{i,t-s}^{\text{PS}} \right)^{-1}, & \text{if } \sum_{i=1}^{n} w_{i,t-s}^{\text{PS}} > 0.1 \end{cases} \tag{34}$$

The adjustment factor f_{S} is necessary in case of a total weight above 10% for subordinated bonds, where the adjustment factor will ensure the 10% limit. Each market value weight $w_{i,t-s}^{\text{PS}}$ in PS is multiplied by f_S, such that the final index constituent weights for subordinated bonds are given by $\overline{w}_{i,t-s}^{j} = w_{i,t-s}^{\text{P}_j} \times f_j$ where $i = 1, \ldots, n$ and $j = \text{S}$.

2. Two variables, α and β, are introduced. Let α be defined as:

$$\alpha = 1 - \sum_{i=1}^{n} \overline{w}_{i,t-s}^{\text{PS}} \tag{35}$$

α can be interpreted as the remaining share of weights available to non-subordinated issues. This share is minimum 90%.

Let β be defined as:

$$\beta = \text{W}^{\text{target}} - \sum_{i=1}^{n} \overline{w}_{i,t-s}^{\text{PS}} \times \text{TM}_{i\in\text{PS},t-s}, \tag{36}$$

where $\text{TM}_{i\in\text{PS},t-s}$ is the time to maturity of subordinated bond i at rebalancing date $t-s$. β can be interpreted as the remaining share of weighted time to maturity available to non-subordinated issues. Thus β is the target WAL for the non-subordinated issues.

3. The eligible issues ex subordinated bonds are divided into two sub-portfolios, sub-portfolio 1 (P1) which includes all issues with time to maturity below or equal to β and sub-portfolio 2 (P2) which includes all issues with time to maturity above β.

$$w_i^{\text{P1}} = \frac{\text{MV}_{i\in\text{P1},t-s}}{\sum_{i=1}^{n} \text{MV}_{i\in\text{P1},t-s}} \quad \text{where } i \in \text{P1 if } 0 < \text{TM}_i \leq \beta \text{ and } \sum_{i=1}^{n} w_{i,t-s}^{\text{P1}} = 1 \tag{37}$$

$$w_i^{\text{P2}} = \frac{\text{MV}_{i\in\text{P2},t-s}}{\sum_{i=1}^{n} \text{MV}_{i\in\text{P2},t-s}} \quad \text{where } i \in \text{P2 if } \text{TM}_i > \beta \text{ and } \sum_{i=1}^{n} w_{i,t-s}^{\text{P2}} = 1 \tag{38}$$

4. The WAL of the two portfolios are calculated (W^{P1} and W^{P2}) using the weights calculated in step 3.

$$W^{P_j} = \sum_{i=1}^{n} TM_{i\in P_j,t-s} \times w^{P_j}_{i\in P_j,t-s}, \text{ where } i = 1,\ldots,n \text{ and } j = 1,2 \tag{39}$$

5. Given the respective WAL for P1 and P2 and the target WAL for P1 and P2 defined by β in step 3 above, adjustment factors f_1 and f_2 ensure the desired target WAL (β) available for the two sub-portfolios.

$$\begin{aligned} W^{P1} \times f_1 + W^{P2} \times f_2 &= \beta \\ f_1 + f_2 &= \alpha \end{aligned} \tag{40}$$

Solving for f_1 gives the following equation:

$$f_1 = \frac{\alpha W^{P2} - \beta}{W^{P2} - W^{P1}} \tag{41}$$

f_2 follows from the constraint in equation (40):

$$f_2 = \alpha - f_1 \tag{42}$$

Adjustment factors f_1 and f_2 can be interpreted as weights to sub-portfolios P1 and P2 respectively. Each market value weight $w^{P_j}_{i,t-s}$ in P1 and P2 are multiplied by f_1 and f_2, such that the final index constituent weights (including subordinated bonds) are given by $\overline{w}_{i,t-s} = w^{P_j}_{i,t-s} \times f_j$ where $i = 1,\ldots,n$ and $j = 1,2$,S.

Thus, by combining and rearranging equations (35), (37), (38) and (40), it can be shown that the sum of constituents will equal 1: $\sum_{i=1}^{n} \overline{w}_{i,t-s} = 1$.

Equivalent, by combining and rearranging equations (36), (39) and (40), it can be shown that the weighted sum of time to maturity will equal the target WAL: $\sum_{i=1}^{n} \overline{w}_{i,t-s} \times TM_{i,t-s} = W^{target}$.

Special Circumstances for Liquidity Indices

All Liquidity indices have a maximum duration limit, and this limit is not included in any rule for both types of Liquidity indices. This is due to a large portion of eligible securities are floating rate notes with a three-month interest rate fixing period and hence a short interest duration. As the markets are not static across time, this circumstance may change. In the event of a reduced portion securities with a short interest rate duration, NBP may change the methodology for incorporating rules or other measures where the duration limits are met.

Notes

[12]If 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 its 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 decisive for the issuer classification.

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

[14]This does not include Norwegian counties and municipalities, which will be classified as Regular Market Group 1, as defined in section 1.5.2.

[15] For details, refer to “Bransjestandard for informasjon og klassifisering av rentefond” footnote 4, page 4.

E Changes to NBP Index Methodology

E.1 August 2018

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

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

E.2 March 2019

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

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

E.3 May 2020

E.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.

E.4 November 2020

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

E.4.2 Sections 1.1.3 and 1.2.5 were added due to inclusion of government bond indices in NBP index family.

E.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.

E.5 June 2021

E.5.1 Appendix C Inclusion of compound sectors RM2/RM3 duration targets and floating rate note indices.

E.6 December 2021

E.6.1 The description of NBP index family in section 1.1 was changed to allow for Liquidity Indices.

E.6.2 Sections 1.2.6 and 1.2.7 were added due to the inclusion of Liquidity indices in NBP index family.

E.6.3 Appendix D was included to describe the Weighted Average Life (WAL) target indices methodology.

E.6.4 The formulas in Appendix C was updated to specify that constituent weights are set at rebalancing date $t - s$.

E.6.5 Throughout the document typos and minor corrections have been done without changing the content or the meaning of the content.

E.7 September 2022

E.7.1 Section 1 Index Description: Open up for Swedish CDS registered bonds in the index family. Simplifying description.

E.7.2 Section 1.1 The index family: Updated figure 1 to allow for expanded High Yield branch

E.7.3 Section 1.1.2 High Yield market: Updated description and figure 3 to allow for expanded High Yield branch

E.7.4 Section 1.2 Eligibility Rules: Updated bullet point three and six to allow for SE-ISIN. Bullet point seven, regarding listing added, which was previously last paragraph in 1.2.1

E.7.5 Section 1.2.4 Specific rules for Liquidity Indices with Low Risk: Third bullet point, exclude senior non-preferred issues.

E.7.6 Section 1.5.1 Security Classification: This section has been changed entirely since 5 classes are more in line with the description laid out in section 1.5.2 and 1.5.3.

E.7.7 Section 1.5.2 Regular Market Groups: New wording, same content. RM4 has always consisted solely of Hybrid Bonds, thus "*Securities otherwise eligible in the Regular Market Indices, but not included in any of the RM groups defined above*" has been removed.

E.7.8 Section 2.5.2 Hedged return: In formula 13, changed under brace text from "*Currency Return*" to "*Spot FX Return* which is more precise. "*Currency Return*" is defined in 3.5.1 Unhedged return, formula 9.

E.7.9 Appendix B, Section B.0.3 Senior Bonds ex Financials Regular Market: Addition of a Swedish benchmark curve.

E.7.10 Appendix B, Section B.0.6 High Yield: Exceptions for SE-ISINs.

E.8 June 2023

E.8.1 Corrected typo in formula solving for adjustment factor f_1 in section D.0.2.

E.9 October 2023

E.9.1 Adjust methodology to allow for new Hybrid Index. Section 1.1: Include Hybrid Index in Figure 1. Section 1.1.1: Include Hybrid Index in description and Figure 2.

E.9.2 In Section 1.5.1 Delete ”(Tier 1)” and in Section 1.5.2 Include ”(Tier 2)” and ”(Additional Tier 1)”.

E.9.3 Specify RM-group 3 in footnote 11.

E.10 March 2024

E.10.1 Section 1.1 Inclusion of credit rating agencies.

E.10.2 Appendix B Credit rating as primary definition of Regular and High Yield Market.

E.10.3 Appendix B B.0.3 Senior Bonds ex Financials Regular Market: Revised and expanded the definition of benchmark curves and increasing the additional basis points from 10 to 20.

E.10.4 Appendix B B.0.6 High Yield: Include credit rating as classification criteria and remove exceptions for subordinated financials and hybrid bonds with SE-ISIN.

E.11 June 2024

E.11.1 Section 1 The section is made general with regard to securities scope.

E.11.2 Section 1.1 Figure 1 is simplified and made more general.

E.11.3 Section 1.1.1 The section is split into smaller sections describing the current aggregated indices (NOK and SEK) and the main sub-index groups.

E.11.4 Section 1.1.2 The section now includes the SE-ISIN only sub-index which will be the High Yield index covering the Swedish market.

E.11.5 Section 1.2 Bullet point specifying allowed ISINs and specification of minimum levels of nominal outstanding amount have been made general to cover a Nordic scope.

E.11.6 Section 1.2.x (except 1.2.2): All specific rules have been changed to cover NOK only indices. This is done by adding "NOK" into the rules.

E.11.7 Section 1.2.2 This section has been added to include a SEK aggregated index. This index will differ from the NOK counterpart with the requirement of credit rating for all constituents and the allowance of put/call optionality.

E.11.8 Section 1.4.2 The section has been revised to allow for other market convention to be included.

E.11.9 Section 1.2.5 Specified the existing practice of the classification of Kommunalbanken AS senior unsecured issues.

E.11.10 Section 1.6 The section has been changed to specify holiday convention for multi market indices (the only current index this apply to is the Nordic High Yield Index).

E.11.11 Section 2.1 In the second and third paragraphs reference to NOK only rules have been deleted or changed to suit the current multi currencies scope.

E.11.12 Section 2.2 Inception dates for new indices are included.

E.11.13 Appendix B A clarification on re-classification has been added to the fourth paragraph (last sentence).

E.11.14 Appendix C Figure 5 are completed with the compound sectors FRN and RM groups duration target indices.

E.12 January 2025

E.12.1 Section 1.1.1: Addition of figure 2 SEK Regular Market, description of, SEK Regular Market Index and SEK Corporate Sub-Indices, Included "NOK" in figure 3 for clarity.

E.12.2 Section 1.2.1: Small adjustments in text for clarity.

E.12.3 Section 1.2.2: Small adjustments in text for clarity.

E.12.4 Section 1.2.3: Included to specify four indices in the SEK Regular Market branch.

E.12.5 Section 1.1.2: Allow DK and FI-ISIN into the Aggregated High Yield Index. Adjustment of currency hedge description.

E.12.6 Appendix B Section B.0.3 Assigning DK and FI-ISIN to credit curves.

E.13 February 2025

E.13.1 Section 1.2.8: New section, specifying NOK and SEK Regular Market Indices.

E.13.2 Section 2: New bullet point including NOK and SEK Regular Market Indices.

E.13.3 Appendix C Specifying Duration 10 indices.

E.13.4 Section 1.1.2: Specification of High Yield Ex Oil & Gas Index.

E.14 May 2025

E.14.1 Section 1.6: Clarification of Holiday Convention.

E.15 December 2025

E.15.1 Section 1.2: Eligibility Rules, bullet point on listing, extended definition of marketplaces/trading facilities where securities can be listed.

E.16 October 2026

E.16.1 Section 2.4 Correction is rewritten.

E.16.2 Appendix C last paragraph (addendum) is rewritten.

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