



NoRe

# Analyses and back-testing of Nibor

30 April 2024

The information in this memo may not be regarded as part of the provisioning of the interest rate benchmark Nibor, and the information provided cannot for any purposes be used as a benchmark.

## Analyses and back-testing of Nibor

Published 30.04.2024.

*The purpose of this memo is to provide users of Nibor with information about NoRe's analyses of Nibor developments, with the aim of ascertaining that Nibor represents the underlying market and economic reality that it seeks to measure.*

*The details of the methodology and analyses used for back-testing are intentionally not revealed with the aim of securing the independence between Nibor and NoRe's back-testing models.*

### Introduction – Nibor and NoRe

Nibor - derived from “Norwegian Interbank Offered Rate” - is a collective term for Norwegian money market interest rates with maturities of one week and one, two, three and six months.

#### **Nibor**

Nibor shall reflect the interest rate level a bank requires for unsecured money market lending in Norwegian kroner to another bank.

According to the definitions in the EU Benchmarks Regulation (BMR), Nibor is an “interest rate benchmark”. Furthermore, Nibor has been recognised by the European Commission as a critical benchmark as referred to in point (b) of BMR Article 20(1).

Norske Finansielle Referanser AS (NoRe) is the administrator for Nibor. Nibor is calculated and distributed by Global Rate Set Systems (GRSS), which also acts as licencing agent for Nibor. NoRe is authorised by Finanstilsynet as administrator for Nibor, pursuant to the BMR Article 34.

### Legal requirements

According to the EU Benchmarks Regulation (BMR) Article 12, an administrator of a benchmark shall use a methodology for determining a benchmark that is robust and reliable and is traceable and verifiable. Conditions to ensure that the methodology complies with the BMR requirements are specified in Regulatory Technical Standard 1352 adopted by the EU Commission in 2021. The RTS (Article 3) elaborates further on requirements to back-testing, both with regards to the frequency of such testing and to the review of results from back-testing.

#### **Public regulation of NoRe and Nibor**

NoRe is established in Norway and operates under Norwegian jurisdiction. As Norway is part of the European Economic Area (EEA), the EU Benchmarks Regulation (BMR) has been incorporated in the Norwegian legislation.

The Norwegian FSA (Finanstilsynet) has been designated as the relevant Norwegian public BMR authority.

## Verifying Nibor – NoRe’s approach

NoRe has developed a set of methods to assess the developments in Nibor and the Nibor input data. These methods span from assessing relevant market developments, domestically and internationally, to studies of each contributor’s input data. Analysis and tests are based on background data provided by the Nibor Panel Banks as well as data collected from independent sources (via global information systems).

Verification of Nibor is a continuous process. NoRe’s assessments are reviewed by the Nibor Oversight Committee on regular basis. The Nibor Oversight Committee has the primary governance oversight of the methodology, determination and dissemination of Nibor. The Nibor Oversight Committee Terms of Reference is published on [NoRe’s website](#).

## Analyses of Nibor – Methods and indicators

### *Economic indicators, market liquidity and the Central Bank’s Policy rate*

NoRe follows closely a set of indicators on economic developments and the status of financial markets, with the aim of identifying factors that have had or may have effects on the development in Nibor. Focus is laid on factors which may affect expectations about the development in the central bank policy rate, the supply of liquidity in the NOK money market, and news affecting international markets.

### The Nibor calculation methodology

The calculation of Nibor is based on submissions of data from a panel of six banks, as specified in the Nibor Calculation Methodology.

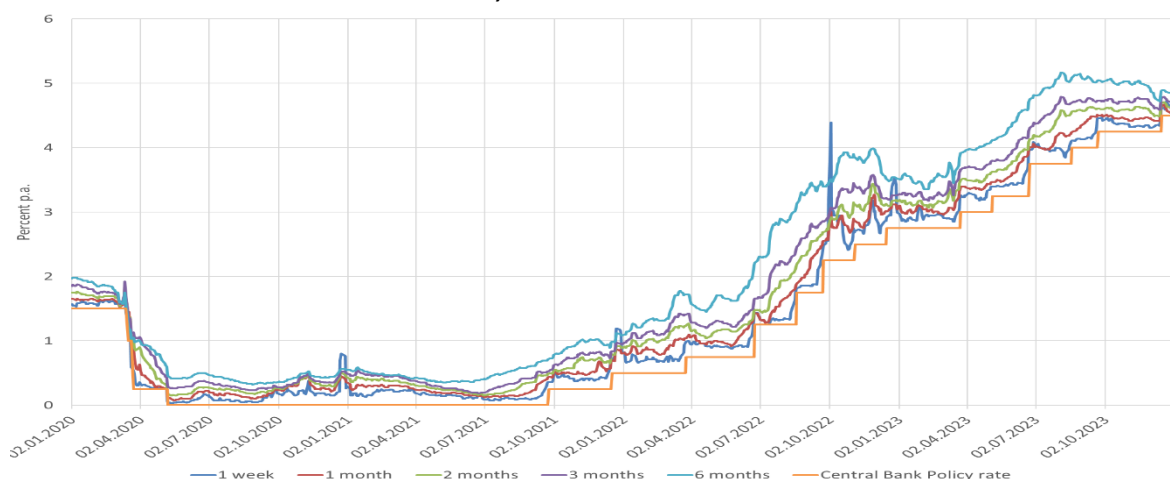
When determining its submissions, the individual bank shall follow the Nibor “waterfall methodology” priority of use of input data, specified in the Nibor Panel Bank Code of Conduct, summarized as follows:

- a. The bank’s own interbank lending transactions concluded with leading banks in the Norwegian Money Market with a minimum value of NOK 100 million at the same day as the Fixing. If none;
- b. the bank’s own borrowing transactions concluded from sales of CDs or CPs denominated in NOK with a minimum value of NOK 100 million at the same day as the fixing. If none;
- c. the bank’s committed price quotes on CDs or CPs denominated in NOK and expert judgements based on the bank’s weighted funding costs in USD and EUR, preferable prices from actual transactions. With exception for the one-week tenor, committed price quotes on CDs and CPs shall be given at least 50 percent weight in the calculations.

A spread shall be added to calculated borrowing rates, so that the submissions reflect the interest rates that the bank would charge for unsecured lending.

The Nibor Calculation Methodology and the Nibor Panel Bank Code of Conduct are published on [NoRe’s website](#).

Chart 1. Nibor and the Central Bank Policy Rate 2020-2023



Source: Norges Bank and NoRe

Central in the analysis stands the yield curve reflecting the Nibor tenors from one week to six months. The short end of this curve is responding in particular on decisions about the central bank’s signalling rate and the current supply of liquidity in the NOK money market. The longer end of the curve is more affected by expectations about the signalling rate and liquidity going forward. NoRe gives most attention to the Nibor 3- and 6-months tenors, as the tenors most widely used as benchmarks.

*NOK interest rates implied from EUR and USD markets*

The Norwegian money market is characterised by liquidity being redistributed between the major market participants by using the currency swap market. This has been the situation ever since the liberalisation of credit markets in the 1980s. The use of currency swaps reflects the characteristics of the small and open Norwegian economy, with relatively large international engagements connected to trade in raw materials and shipping. In the aftermath of the financial crisis of 2007-08, the use of unsecured interbank market lending in Norwegian kroner contracted from an already low level, in line with the developments observed internationally.

The data which Nibor is calculated from reflects the use of currency swaps in banks’ liquidity management. This still applies, even after the introduction of the new waterfall-based calculation model for Nibor in 2020. The input data to Nibor is usually based on the panel banks’ funding costs, added a bid/ask-spread (a waterfall “level c” submission). The introduction of minimum 50 percent weight to NOK dominated quotes on CDs or CPs did not provide visible effects on Nibor.

For back-testing 3- and 6-months Nibor NoRe calculates synthetic rates from USD and EUR interest rates and foreign currency quotes. All data is all collected from independent sources. These rates should, in theory, be affected by similar factors as Nibor, and hence imply relatively similar movements. Statistical indicators show high degree of correlation between the two set of rates. Developments in these rates are regularly analysed against Nibor.

NoRe has chosen to call the synthetic rates “**RnoX**”. The model is anchored in data covering the period 2012-2022, where 2012 was the first whole year that Nibor was produced based on a formal and publicly available framework. The RnoX-model is easy to visualize and comprehend. Chart 2 illustrates how RnoX and Nibor have developed in parallel.

*Chart 2. 3-months Nibor vs. RnoX - Movements in quarterly averages - 3 months*

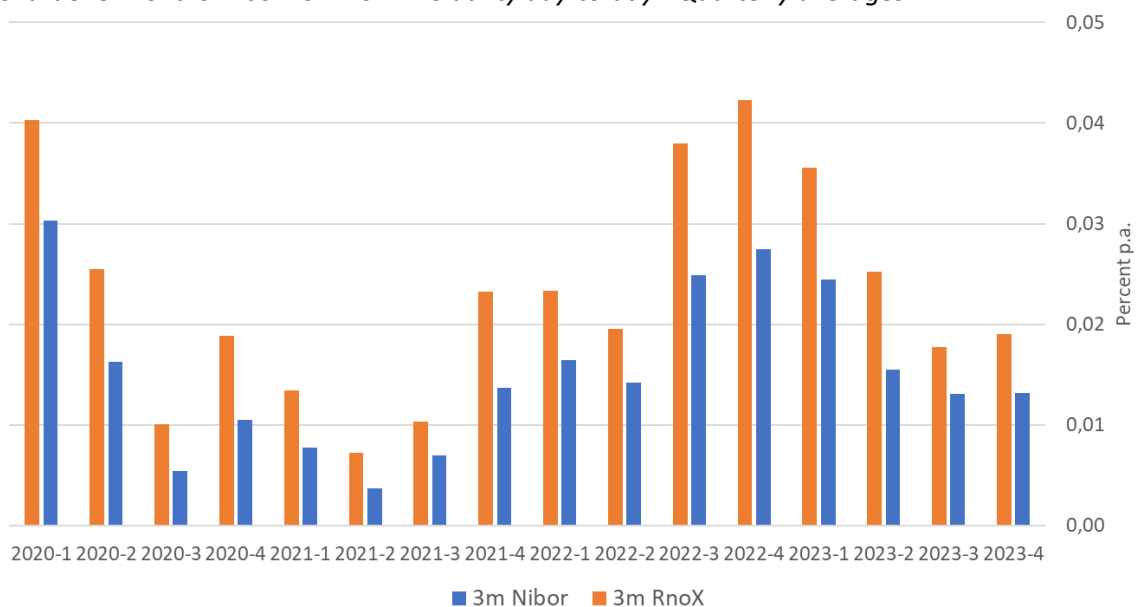


Source: NoRe

While Nibor is based on input data from a panel of banks which shall reflect the interest rates that the banks would charge on lending, the RnoX is a purely statistical figure which is calculated based on economic theory (“covered interest rate parity”). Covered interest rate parity depend on very strong assumptions, including perfectly functioning markets and no transaction costs. Therefore, it cannot be expected that RnoX equals Nibor. Still, statistical indicators show high degree of correlation between the rates.

The difference between Nibor and RnoX is most apparent when it comes to volatility. RnoX is generally somewhat more volatile than Nibor. This should be seen in light of RnoX being an interest rate which is implied from foreign interest rates and currency swaps which do not necessarily reflect local conditions. Chart 3 illustrates the day-to-day volatility of Nibor and RnoX.

*Chart 3. 3-months Nibor vs. RnoX - Volatility day-to-day - Quarterly averages*



Source: NoRe

### *Nibor vs. the FRA market*

To make an appraisal of the movements in the difference between the 3- og 6-month Nibor tenors, NoRe calculates an implicit 3-month forward 3-months rate, “Nibor 3:6 FWD”. This rate is assessed against data from the Forward Rate Agreement market (FRA). FRAs are traded daily with fixing against 3-month Nibor on forward IMM dates (the 3rd Wednesday of March, June, September, December). Since an FRA converges towards the 3-month Nibor as it gets closer to maturity, NoRe calculates a synthetic rolling FRA, “3:6 FRA”, with a daily maturity equal to “Nibor 3:6 FWD”. Hence, the “Nibor 3:6 FWD” and the “3:6 FRA” can be assessed against each other. Comparisons of the developments in the rates have not revealed differences that cannot be explained by differences in the underlying markets.

### *Nibor contributions background data*

The Nibor Panel banks provide background information related to their submissions to Nibor. The relevant background information to be provided depends on what level in the Nibor waterfall methodology the individual submissions were based on.

The lack of unsecured NOK-denominated interbank market transactions implies that most submissions to Nibor are based on the panel bank’s assessments of its funding costs and a bid/offer-

spread. For such submissions, the bank shall provide background information about the underlying elements in their calculations, including CD/CP quotes, foreign funding interest rates, foreign exchange spot and term rates, bid/offer spreads and the weights applied for each individual component.

The background data are assessed by NoRe against available relevant market data with the objectives to understand developments in Nibor and to evaluate each panel bank's submissions.

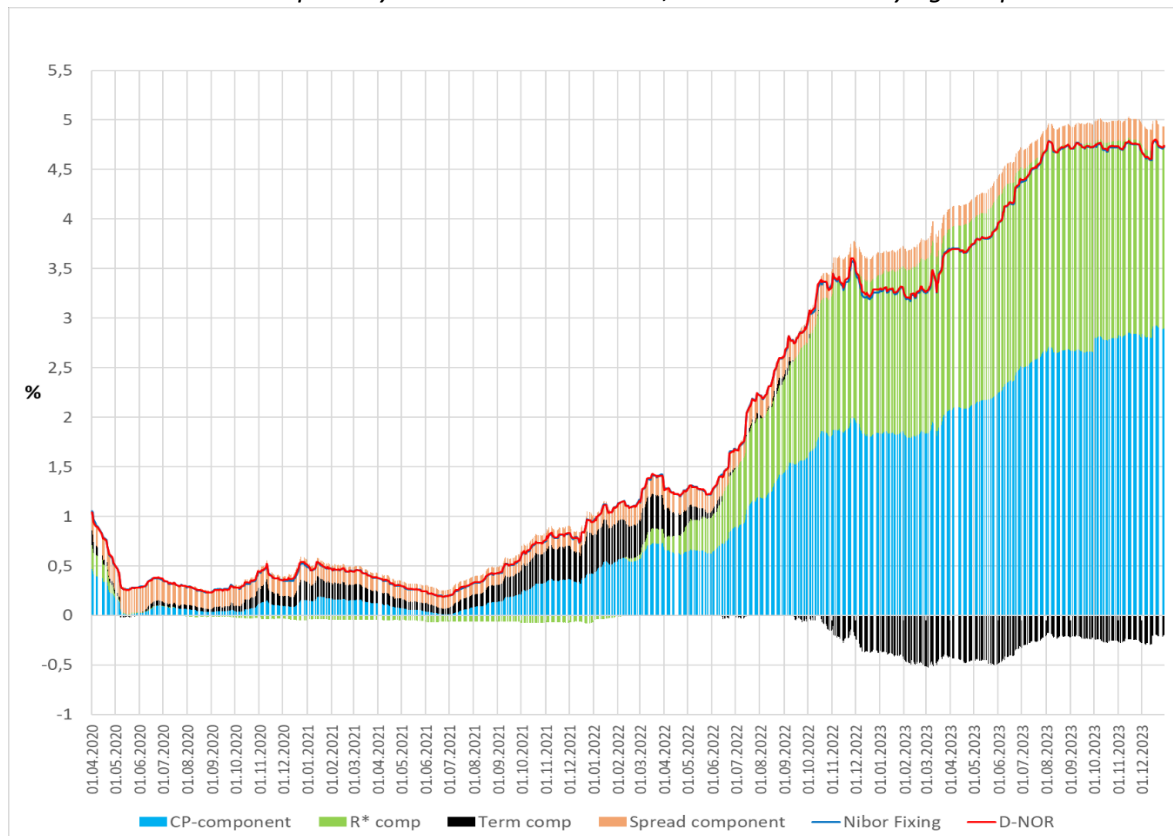
#### *The Nibor Transparency model / D-NOR calculation*

NoRe has developed the "Transparency model" which is based on the background data provided by the panel banks. The model visualises the individual building blocks which Nibor has been based upon and calculates a theoretical interest rate, "D-NOR". D-NOR is calculated as the weighted average of all panel banks' contributions to each building block of Nibor. All quotes are used in the D-NOR calculation, while the Nibor calculation disregards the highest and lowest submission.

The Transparency model for the 3-month tenor is illustrated in Chart 4. D-NOR and the corresponding Nibor fixing values are shown as lines. The underlying components are shown as stacked columns, where each component is expressed as the weighted contribution measured in percentage points from

- Committed price quotes on CDs or CPs (CP-component)
- Foreign funding costs (R\* comp)
- Foreign Exchange Term premia (Term comp)
- Lending-borrowing margin (Spread comp).

*Chart 4. The Nibor Transparency Model. 3-month Nibor, D-NOR and underlying components.*



R\*: Foreign lending costs, Term: Term premium from the foreign exchange market

Source: NoRe

Nibor is primarily based on level c submissions. The calculation of Nibor is based on a trimmed average of panel bank submissions, after removing the highest and lowest submissions. The D-NOR is based on simple averages of data on all submissions and differ somewhat from Nibor. However, the trimmed mean is normally not very different from the simple average of all submissions.

The Transparency model for the 3-month tenor is calculated and illustrated in NoRe's Nibor Transparency Statement, which is published regularly on NoRe's websites. Please see the latest version of the Transparency Statement for a closer explanation of the model.

The Transparency model has been further developed into a tool for studying the submissions to Nibor from each individual bank.

### Periodic assessments

The Nibor Oversight Committee is responsible for reviewing the Nibor benchmark's definition and methodology. NoRe's analyses and back-testing are important input to the committee's reviews.

Further to the committee's regular assessment of Nibor developments in its quarterly meetings, the committee performs a yearly assessment of the Nibor calculation methodology and framework. In its March 2024 meeting, the Nibor Oversight Committee concluded that Nibor reflected the relevant market in 2023, and that the Nibor Calculation Methodology is still suitable for its intended purpose.

More information about the Nibor Oversight Committee's assessments and conclusions is provided in the summaries of committee meeting minutes published on NoRe's website.

### Concluding remarks

The NoRe administration assesses Nibor against developments in relevant markets on a continuous basis. The models developed have helped to ensure that these efforts are consistent and robust. As the relevant markets develop, and the availability of relevant benchmarks and indicators change over time, NoRe's methods for analyses and back-testing of Nibor are assessed continuously and further developed. At present, NoRe assesses the Norwegian OIS Market and introductions of new foreign interest benchmarks as potential sources of information to be used for assessment of Nibor developments.