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20 March 2013

Calculation of the NIBOR rate

Reference is made to the letter from the Ministry of Finance to Finanstilsynet (Financial Supervisory Authority of Norway) of 14 December 2012 with a copy to Norges Bank. The Ministry of Finance requests Finanstilsynet to assess benchmark interest rates in Norwegian financial markets in consultation with Norges Bank. The Ministry also refers to measures proposed by Finanstilsynet to strengthen the existing system for the calculation of the NIBOR rate and requests that the measures be implemented as soon as possible.

As there are currently no viable alternative benchmark rates, it is important that NIBOR is calculated in a way that instils confidence among all market participants. This is the background for the initiative taken by the Bank in 2010 towards the establishment of rules for the calculation of NIBOR. After the rules were established and came into effect in August 2011, the Bank highlighted the need for guidelines to avoid conflicts of interest in the calculation of NIBOR in its letter to the Ministry of Finance of 12 January 2012. On 1 February 2013, Finance Norway, the trade organisation for banks, expanded the NIBOR rules to include a requirement for each panel bank to have clear guidelines for identifying and dealing with any conflicts of interest that may arise as a result of the bank's own interests in markets where NIBOR is used as a benchmark.

The authorities in a number of countries have found evidence of manipulation of international benchmark interest rates and some large international banks have been fined. Norges Bank has received enquiries from market participants abroad suggesting NIBOR might also have been

calculated on a faulty basis. Norges Bank informed Finanstilsynet about these enquiries in its letter of 16 August 2012, emphasising that Norges Bank had no reason to assume that NIBOR was being manipulated but calling attention to the need for measures to strengthen confidence in NIBOR.

In the attachment to this letter, the calculation of the NIBOR rate is discussed in the light of ongoing international efforts to improve confidence in benchmark rates such as LIBOR, EURIBOR, STIBOR and CIBOR. The measures proposed by Finance Norway in its letter to Finanstilsynet of 8 February 2013, with a copy to Norges Bank, have also been considered. Although several of these measures are in line with Norges Bank's assessment, the Bank's view is that the measures should go somewhat further than proposed by Finance Norway.

In the attachment, we note that although NIBOR is a NOK rate, it is nonetheless calculated as a USD rate swapped into a NOK rate in the forward exchange market. Because of the mechanical connection to the forward premium, NIBOR volatility is higher than for benchmark rates in other countries. In the Bank's opinion, this volatility makes NIBOR more unpredictable than other countries' benchmark rates and more open to suspicion of manipulation. Confidence in Norwegian financial markets can be impaired if non-panel participants do not understand the factors underlying changes in benchmark rates from one day to the next. It is therefore Norges Bank's view that banks should calculate NIBOR in such a way as to reduce volatility. Panel banks should report the interest rate they would charge on lending in NOK, as described in the definition of NIBOR. In the absence of actual unsecured interbank lending transactions, each panel bank must set its contribution based on judgement. Judgement should be based on the broadest possible range of price information, not only from one particular dollar rate and the forward exchange market, in line with international recommendations such as in Sweden and Denmark. Banks should be able to present documentation of their exercise of judgement when requested. This will bring practice in Norway with regard to benchmark rate contributions more into line with recommendations in other countries.

The financial sector should focus on developing an OIS market¹ in Norway. An OIS reflects an expected overnight rate. OIS rates with different maturities provide a virtually risk-free yield curve. OIS can be traded in the market and would be an important cross bearing for NIBOR. An OIS market will provide a clearer indication of the factors underlying changes in NIBOR and thus contribute to greater transparency and confidence. There is an OIS market in all comparable

¹ OIS – Overnight Index Swap

countries.

In Norges Bank's view, further clarification of the rules is needed in order to avoid conflicts of interest in banks contributing to NIBOR. The UK Wheatley Review, which discusses LIBOR submissions, recommends that contributors to a benchmark rate should be kept separate from banks engaged in derivatives trading: *...Specifically, LIBOR submitters should be physically separated from interest rate derivatives traders...*² In order to generate confidence in NIBOR submissions, the Bank holds the view that this process must be completely protected from employees with individual mandates to take risk, i.e. employees taking active positions in instruments for which NIBOR is the benchmark and whose own interests may be served (for example via bonuses) by NIBOR movements in one or the other direction.

In its review of STIBOR, the Riksbank conducted interviews of STIBOR panel banks and states the following in its report: *...It becomes apparent that the responsibility for making each individual bank's daily Stibor submissions lies primarily with the banks' treasury departments, which are responsible for the banks' funding. One important reason for this allocation of responsibility is that the Stibor submissions should reflect a bank's cost of borrowing money. Another is that the bank's treasury departments are often separate from the other operations in the bank, such as, for example, trading on behalf of customers and to some extent the bank's own financial assets. By separating these functions, there is less incentive for individual traders' or the bank's own net trading positions to influence which submissions the bank makes when setting Stibor...*³

Norges Bank shares this view and emphasises that confidence in NIBOR submissions may be critically dependent on the knowledge that individuals setting a bank's submission cannot at the same time serve their own interests.

Norges Bank welcomes the plans to strengthen public supervision of NIBOR and Finanstilsynet's intention to monitor panel banks with a particular focus on information

² Cf. The Wheatley Review of LIBOR: final report, Section 4.2.1, see Wheatley (2012).

³ Cf. Riksbanken (2012), pp. 19-20.

management and conflicts of interest, cf. the finance minister's response in the Storting to parliamentary question no. 740 on 8 February 2013.

Norges Bank will not have a role in the actual calculation of NIBOR or its supervision. Involving the Bank could generate uncertainty as to its role as the central bank. As NIBOR is important for the conduct of monetary policy and for financial stability, however, Norges Bank should be informed about how Finance Norway and the relevant supervisory authorities supervise the calculation of NIBOR and how any complaints related to NIBOR are assessed.

Yours sincerely,

Kristin Gulbrandsen

Anders Svor

Attachment to “Calculation of the NIBOR rate”¹

20 March 2013

1. Introduction

In its letter to Finanstilsynet (Financial Supervisory Authority of Norway) of 14 December 2012, with a copy to Norges Bank, the Ministry of Finance requests Finanstilsynet, in consultation with Norges Bank, to prepare the following:

- a description of how benchmark interest rates are currently calculated and used in Norwegian financial markets;
- an assessment of whether the level of NIBOR submissions correctly reflects prices for unsecured interbank loans and whether the calculation of the NIBOR rate is sufficiently robust;
- an assessment of whether the manner in which NIBOR is constructed and calculated should be changed;
- an assessment of possible alternatives to NIBOR, in particular alternatives based on actual financial market transactions, and, if possible, outlines of one or more alternative systems;
- an assessment of the need for – and if so, a draft of – new regulations to strengthen supervision of the calculation and use of benchmark interest rates in Norwegian financial markets.

Finanstilsynet and Norges Bank have agreed that Norges Bank will in particular provide input on the first four points.² These are discussed below.

In this connection, Norges Bank also refers to a letter from Finance Norway (FNO) to Finanstilsynet of 8 February 2013, with a copy to Norges Bank, in which FNO discusses in an attachment the same issues that the Ministry of Finance is requesting Finanstilsynet to examine in consultation with Norges Bank. Many of FNO’s views are in line with the Bank’s, but in the view of the Bank, there is a need for measures that go somewhat further (cf. discussion below). The Bank agrees with FNO’s assessments on a number of points. FNO is considering “eliminating the intraday NIBOR rate” (cf. point c iii of their attachment). We believe that this could make NIBOR quoting a more orderly process, since quoting before and after 12 noon has no clear function. Furthermore, Norges Bank supports FNO’s assessments regarding fewer maturities (FNO’s attachment, point c i³).

¹ This memo draws to some extent on “Risk premiums in NIBOR and other countries’ interbank lending rates”, *Staff Memo* 21/2012, Norges Bank, and the attachment to a letter from Norges Bank to Finanstilsynet of 16 August 2012.

² The background to this letter and prior correspondence are provided in an appendix to this attachment.

³ Through autumn 2012 and up to the present, a number of international reports have been published and consultation statements issued on international benchmark interest rates by supervisory authorities, banking sector organisations and central banks (see the list of the most important at the end of this attachment). These will be referred to in part in the discussion below.

2. A description of how benchmark interest rates are currently calculated and used in Norwegian financial markets

The principal benchmark interest rate in Norwegian financial markets is NIBOR. A number of financial products, including interest rate derivatives, are linked to this rate. According to the BIS triennial survey, the outstanding notional amount in interest rate derivatives in NOK was around NOK 4 100bn in June 2010 (comprising NOK 900bn in forward rate agreements (FRAs) and NOK 3 200bn in interest rate swaps). Average daily turnover in interest rate derivatives in April 2010 was around NOK 70bn).⁴ NIBOR is also an important benchmark for the bond market and for a number of business sector loans. For banks that obtain funding in the Norwegian bond market, funding costs may be linked to NIBOR.

NIBOR is defined in a set of rules adopted by FNO's Board on Banking and Payment Systems, which entered into force on 1 August 2011. On the FNO website, NIBOR is defined as follows:

*"NIBOR shall reflect the interest rate level lenders require for unsecured money market lending in NOK, based on interest rates banks charge on lending to leading banks active in the Norwegian money and foreign exchange markets."*⁵

Like other international benchmark interest rates, such as LIBOR and EURIBOR, very few transactions actually take place as described in the definition of the Norwegian benchmark rate. These benchmark interest rates are primarily meant to express the price of interbank loans, *if the transactions had actually taken place*.⁶

NIBOR has traditionally been quoted as a currency swap rate, derived from the USD rate. Given this construction, NIBOR can be written as:

(1) $NIBOR = \text{the USD rate} + \text{the forward premium}$

The forward premium is the difference between the forward exchange rate and the spot rate and expresses the price of swapping currencies today and at the same time reversing the swap in the same amount in the future, for example in three months (the forward premium reflects the interest rate differential between the currencies). The forward premium is traded in the market. The USD rate is in principle intended to reflect the price of borrowing USD in the unsecured interbank market. Prior to the financial crisis, the NIBOR panel banks used the USD LIBOR rate as a basis for calculating NIBOR. During the financial turbulence, LIBOR probably underestimated the actual borrowing costs for Norwegian banks, and in autumn 2008, NIBOR banks agreed to base their setting on the USD rate published by the brokerage house Carl Kliem in Frankfurt, a rate considered to be closer to a real rate. The Kliem rate is

⁴ The BIS survey can be downloaded here: http://www.norges-bank.no/Upload/81131/BIS_Rapport_2010.pdf

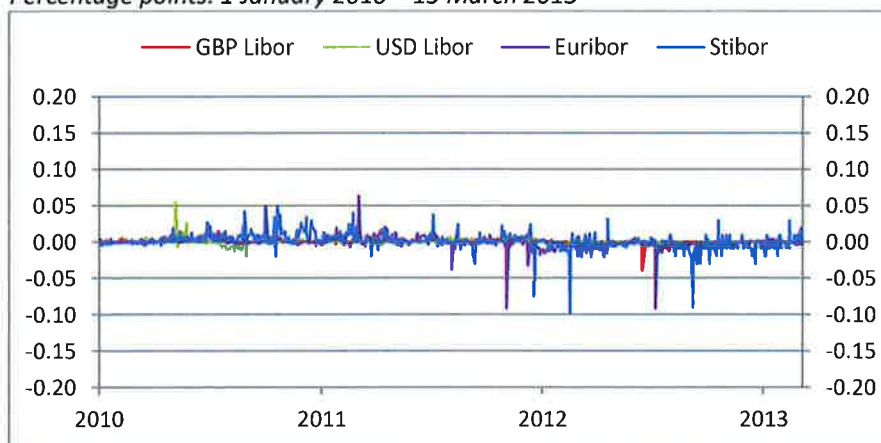
⁵ For a detailed definition, see <http://www.fno.no/en/Main/Markets/NIBOR---the-Norwegian-Interbank-Offered-Rate/>.

⁶ The NIBOR panel banks are DNB, Nordea, Danske Bank, Handelsbanken, SEB and Swedbank.

said to express the cost for European banks of borrowing USD through the interbank market.⁷ Given the USD rate that banks apply and the forward premium, the implicit NOK rate follows.

Chart 1 shows daily changes in three-month EURIBOR, USD LIBOR, GBP LIBOR and STIBOR, while Chart 2 shows the daily change in three-month NIBOR.⁸ NIBOR volatility is considerably higher than volatility in the other benchmark interest rates. NIBOR is volatile because the underlying components are volatile. Charts 3 and 4 show daily changes in the Kliem rate and in the forward premium, respectively. Charts 5-7 show daily changes in the NOK interest rate swapped from Kliem, the GBP rate swapped from Kliem and the SEK rate swapped from Kliem.⁹ The volatility in other countries' swap rates is in line with the volatility in the NOK rate swapped from Kliem (which in turn is close to the volatility in NIBOR because the USD rate on which NIBOR is based is close to Kliem). Thus, NIBOR volatility is not higher than other countries' benchmark rates because volatility in the forward premium for NOKUSD is higher than the forward premium volatility for other currencies. The reason for the difference is that high forward premium volatility has a direct impact on the NIBOR benchmark rate, which is a swap rate, unlike other benchmark rates that are not quoted as swap rates. This is also illustrated in Charts 6 and 7, which show that the changes in the benchmark rates STIBOR and LIBOR are considerably smaller than the changes in the respective swap rates.

Chart 1. Daily changes in three-month EURIBOR, USD LIBOR, GBP LIBOR and STIBOR. Percentage points. 1 January 2010 – 13 March 2013



⁷ The Kliem rate is very close to the rate achieved by using three-month EURIBOR and swapping to USD in the forward exchange market (see "Estimating forward Nibor premiums", *Economic Commentaries* 5/2012, Norges Bank and "Risk premiums in NIBOR and other countries' interbank lending rates", *Staff-Memo* 21/2012, Norges Bank).

⁸ The sources for all charts in this memo are Bloomberg, Reuters and Norges Bank.

⁹ For each currency, the swap rate is calculated in a manner analogous to equation 1, where the USD rate is set equal to Kliem for all currencies, and where the respective forward rates for each currency are measured against USD. The difference between Chart 2 and Chart 5 is that Chart 2 shows changes in NIBOR as quoted on Reuters, while Chart 5 shows changes in the NOK rate swapped from Kliem. If the USD rate on which NIBOR is based were exactly equal to Kliem, these charts would be identical.

Chart 2. Daily changes in three-month NIBOR.
Percentage points. 1 January 2010 – 13 March 2013

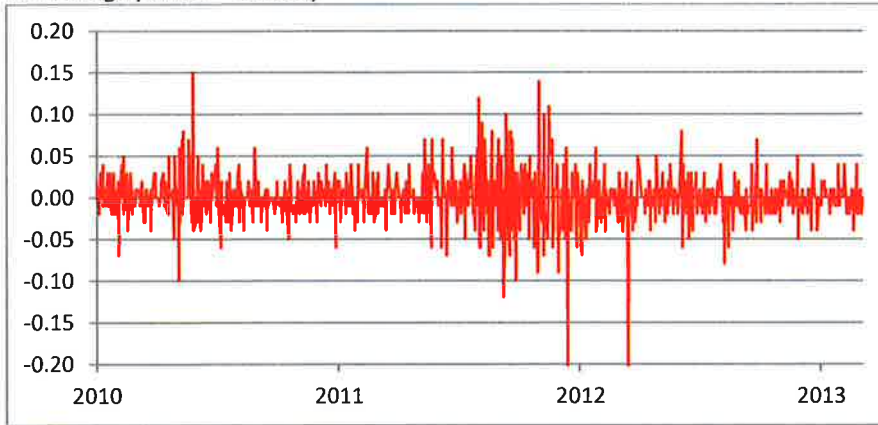


Chart 3. Daily changes in the forward premium for NOKUSD.
Percentage points. 1 January 2010 – 13 March 2013

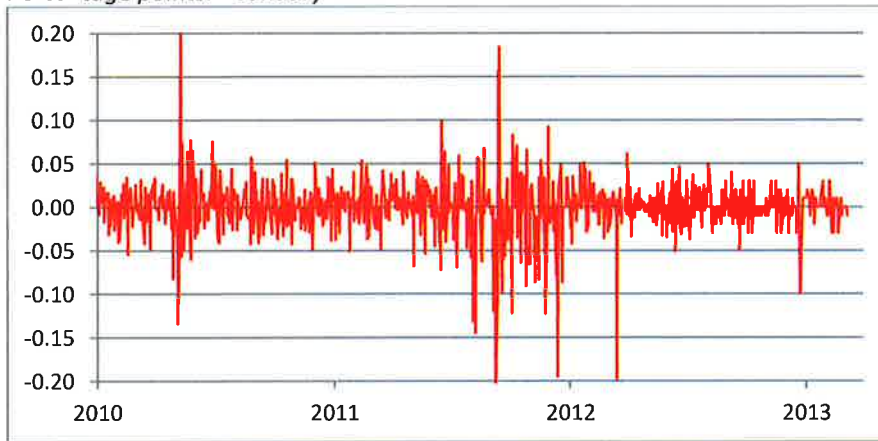


Chart 4. Daily changes in the Kliem rate.
Percentage points. 1 January 2010 – 13 March 2013

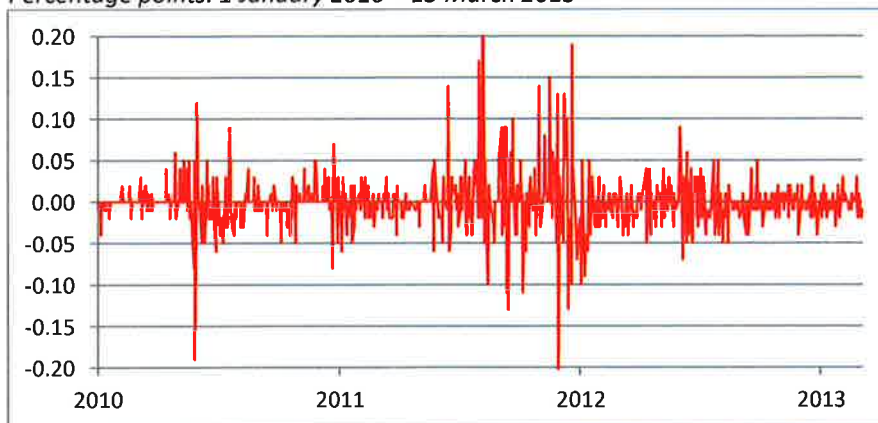


Chart 5. Daily changes in the NOK rate swapped from Kliem

Percentage points. 1 January 2010 – 13 March 2013

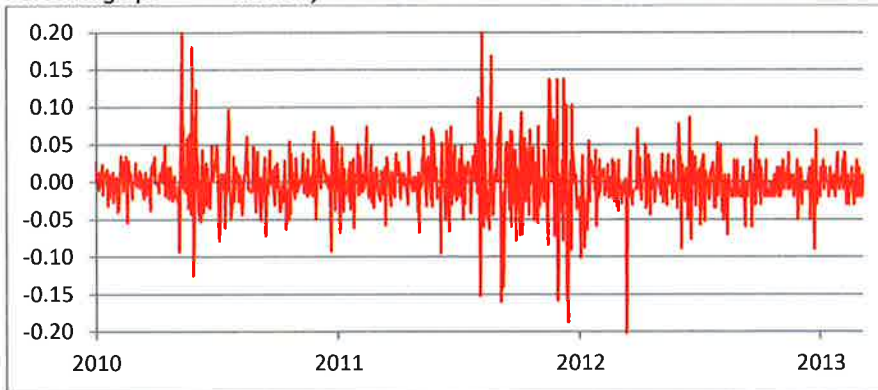


Chart 6. Daily changes in the GBP rate swapped from Kliem

and GBP LIBOR. Percentage points. 1 January 2010 – 13 March 2013

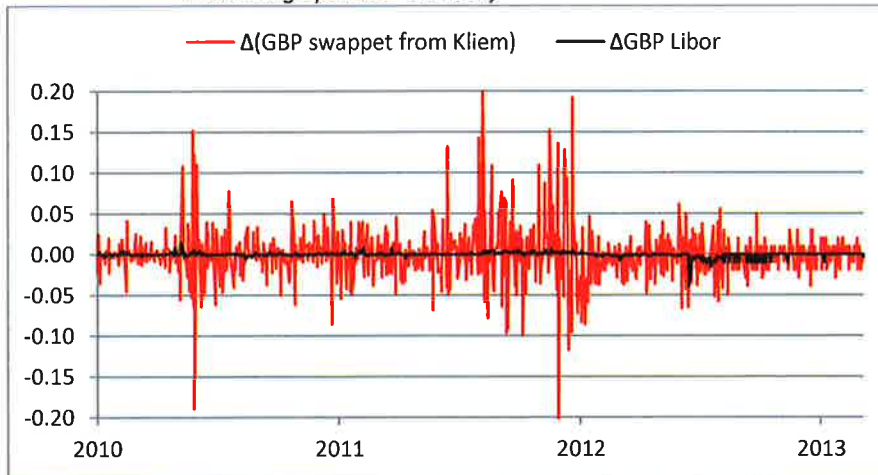
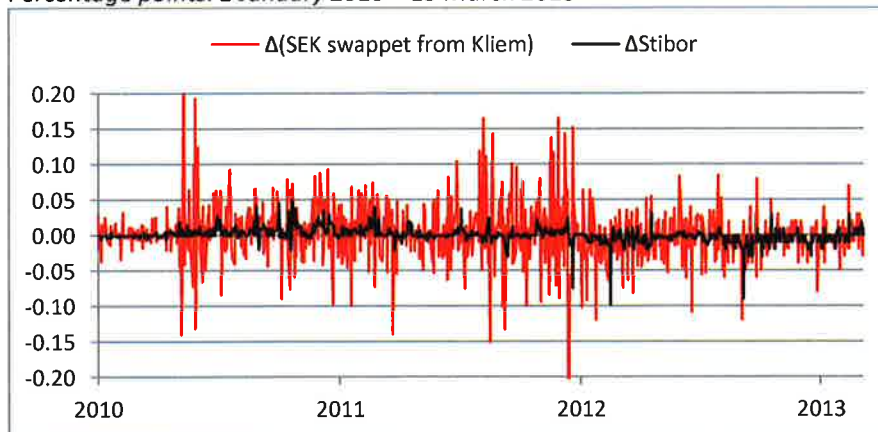


Chart 7. Daily changes in the SEK rate swapped from Kliem and STIBOR.

Percentage points. 1 January 2010 – 13 March 2013



The impression given by the charts is supplemented by the table below, which shows the standard deviation for daily changes in various interest rates, measured in basis points, for three periods: January 2010 – March 2013 and the two intermediate periods January 2010 – July 2011 and August 2011 – March 2013. The table shows the following:

- NIBOR volatility is considerably higher than volatility in other countries' benchmark rates.
- Volatility in rates swapped from Kliem is approximately equal for NOK and SEK, and is in turn somewhat higher than volatility in the GBP rate swapped from Kliem.
- Volatility in the NOK rate swapped from Kliem is somewhat higher than volatility in NIBOR. A possible interpretation is that banks apply Kliem in principle, but disregard the most extreme fluctuations.

Table 1. Standard deviation for the daily change in interest rates. Basis points

	Benchmark rate						Kliem	Calculated rates from the foreign exchange swap market		
	CIBOR	EURIBOR	GBP LIBOR	USD LIBOR	STIBOR	NIBOR		NOK from Kliem	SEK from Kliem	GBP from Kliem
Jan. 10-Mar. 13	1.2	0.8	0.3	0.3	1.1	3.2	3.4	4.0	4.2	3.3
Jan. 10-Jul. 11	0.8	0.6	0.2	0.4	0.9	2.6	2.6	3.4	3.8	2.8
Aug. 11-Mar. 13	1.5	0.8	0.4	0.2	1.2	3.7	4.1	4.5	4.5	3.8

Columns 2-8 show the standard deviation for changes in CIBOR, EURIBOR, GBP LIBOR, USD LIBOR, STIBOR, NIBOR and Kliem respectively, while columns 9-11 show this for the rates for NOK swapped from Kliem, SEK swapped from Kliem and GBP swapped from Kliem, respectively.

3. An assessment of whether NIBOR correctly expresses the cost of unsecured interbank loans and whether the calculation of the NIBOR rate is sufficiently robust

A principal question is which characteristics a benchmark interest rate should have. The literature emphasises that a benchmark rate should be related to banks' marginal borrowing costs.¹⁰ Assume, for example, that an unsecured bank bond is priced at the benchmark rate plus a premium. When the benchmark rate reflects liquidity premiums in the market and banks' credit premiums, the lender will automatically be compensated for poorer liquidity and higher credit risk. This is primarily a characteristic of the interest rate on unsecured interbank loans.

There is virtually no activity in the unsecured interbank market at maturities of more than a few days. Thus, in assessing whether NIBOR correctly expresses the cost of unsecured interbank loans, there is no traded rate against which NIBOR can be compared. However, the safest NIBOR panel banks apply a USD rate that is higher than their actual borrowing costs in USD. Since autumn 2008, banks have applied a USD rate close to Kliem, a rate higher than the rate highly creditworthy banks must pay in the CP and CD markets (which are also unsecured markets).¹¹ In this sense, NIBOR would have been lower if banks had

¹⁰ See BIS paper (2013): "Towards better reference rate practices: a central bank perspective" and Sveriges Riksbank (2012): "The Riksbank's review of Stibor".

¹¹ Commercial paper (CP) and certificates of deposit (CD).

applied their actual borrowing costs in USD. Banks will maintain that NIBOR should reflect the marginal cost of borrowing funds at short notice and that the interbank USD rate (Kliem) expresses this marginal cost more accurately. In the interbank market, it is possible in principle to borrow unsecured funds at short notice, while borrowing in the commercial paper market to a greater extent follows an issue program that may be more fixed over time. Banks would therefore claim that a NOK rate swapped from the USD commercial paper market rate does not reflect the cost of obtaining NOK unsecured at short notice. How quickly a bank can obtain funding in the commercial paper market is nonetheless a key question: the faster this can occur, the more it can be claimed that the commercial paper market rate expresses the actual marginal USD cost and the more reasonable it would be to base NIBOR quoting on the commercial paper market rate.¹² It is likely that the rate on three-month unsecured loans between the most creditworthy banks in Norway would have been lower than NIBOR if the trades had taken place. Even so, conclusions cannot be drawn with any certainty.

In assessing the level of NIBOR, it must also be noted that the extent to which it is in a bank's interest for NIBOR to be "high" or "low" over time can vary from bank to bank. Banks are exposed to NIBOR on both the asset and liability sides of the balance sheet, and the net position (and thus whether a bank will profit from a high or low NIBOR) is not easy to observe and is likely to vary over time. Banks may also vary considerably in this respect, depending on funding structure. In isolation, a bank's asset side income will increase from an increase in NIBOR. If a considerable share of the bank's funding is also linked to NIBOR, the net effect on earnings is uncertain. This means that banks with a limited share of funding linked to NIBOR could profit from a high benchmark rate, while banks with a considerable share of funding linked to NIBOR will not necessarily profit from a high NIBOR rate.

However, it is Norges Bank's view that NIBOR quoting is not sufficiently robust to possible manipulation. While we do not have evidence to indicate that NIBOR has been manipulated, the Bank believes that NIBOR is open to manipulation. Because NIBOR is quoted as a currency swap rate, where high forward premium volatility spreads immediately to the benchmark rate, it is difficult to determine whether a given change in NIBOR is due to a change in market conditions or to an "irregularity". A bank could claim, if it so wished, that the USD rate it is facing is somewhat higher or lower than it is in reality, enabling the bank to quote a NIBOR rate that is somewhat higher or lower than it otherwise would be. It is incorrect to claim, as some observers do, that NIBOR is more difficult to manipulate than other countries' benchmark rates because the rate is partly traded (the forward premium). In the same way a chain is only as strong as its weakest link, it is easy to influence NIBOR because banks can change the USD rate they apply and "hide" this change behind general high volatility. In addition, NIBOR can be influenced by a bank changing its prices in the forward market in one or the other direction just before the noon setting, depending on whether it wants a higher or lower NIBOR. This might, of course, require the bank to undertake actual trades, but it is fully possible.

Some observers point out that NIBOR is difficult to influence because NIBOR can continually be observed in real time on the Thomson Reuters information system. However, the fact that the rate can be

¹² This issue is discussed in detail in Section 7 of *Staff-Memo 21/2012*.

observed at all times provides no information about whether or not it is being manipulated. Some also claim that NIBOR is difficult to manipulate because it is calculated as an average after the highest and lowest quotes have been excluded. If, in an attempt to manipulate NIBOR, a bank were to submit an excessively high rate, it is certainly correct that the bank may risk being excluded from the calculation basis that day. However, the bank that would otherwise have had the highest rate would then be included in the calculation, contributing to a higher NIBOR. Similarly, a bank may submit a rate that is not necessarily considerably higher, but somewhat higher than implied by market conditions and with some probability be included in the calculation. Moreover, as mentioned, a bank can influence the rate in the forward market that all banks face. Excluding the highest and lowest values would then have less impact.¹³ Internationally, several banks have been given heavy fines for attempting to manipulate USD LIBOR. There are 18 banks on the USD LIBOR panel. On the NIBOR panel there are six.

With a relatively small number of panel banks determining the benchmark rate, there may also be a risk that individual banks' contributions to NIBOR will be influenced by other banks' contributions, if these are quoted through the day. This is also pointed out by FNO (cf. attachment to the above-mentioned letter to Finanstilsynet with a copy to Norges Bank, section c, bullet point iii, last paragraph): *"...In other countries, weight has been given to the fact that contributions to interest rate calculations may be influenced by knowledge of other banks' price-setting. However, this argument can be countered by alleging that efficient price-setting requires market participants to see what the price level in the market actually is..."*

With more banks on the NIBOR panel, quoting might become more robust to some banks being influenced by and "taking cues from" other banks in NIBOR quoting.

4. An assessment of whether the manner in which NIBOR is constructed and calculated should be changed

According to the definition, NIBOR must be understood to be a NOK interest rate. Despite the definition, NIBOR continues to be quoted as a currency swap rate, so that volatility in the USD rate and in the forward premium has a direct effect on NIBOR (cf. Section 2). This is a disadvantage, since it makes it easier to influence NIBOR (cf. section 3). If confidence in NIBOR is to be restored, the practice of quoting it as a swap rate should be changed, to reduce volatility. Lower volatility will make NIBOR more robust to manipulation.

Adherents of the current practice of setting NIBOR as a swap rate might make the following counterargument:

- To lend NOK to another bank, the lender must first obtain NOK. In Norway, this is possible only via the forward exchange market. The forward premium is traded in the market, and is determined by supply and demand in the NOK/USD market. To enter into a forward trade, the bank needs USD, thus it needs to borrow USD at short notice in the unsecured interbank

¹³ Note that although LIBOR is also calculated by excluding the 25% highest and 25% lowest values, this did not prevent LIBOR from being manipulated.

market. The USD rate can also change, depending on supply and demand in the international money market. Given these circumstances, it may be argued that NIBOR reflects the correct cost of unsecured interbank loans.

Nevertheless the following question arises: *Why must NIBOR banks apply volatile forward points and a USD rate at which they do not trade to express the interest rate they charge on NOK loans that do not take place?* No trades are made at the NIBOR rate, i.e. banks do not actually have to lend NOK to other banks, and thus do not need to obtain USD in the forward market. The reason banks frequently give for the swap construction is that there is virtually no turnover in the Norwegian money market except for the very shortest maturities and that NOK liquidity can be obtained in the forward market. It is correct that NOK liquidity is largely to be found in the forward market, but banks do not need that liquidity to make a submission to NIBOR. Turnover in the unsecured interbank market for maturities of 3-12 months is also virtually non-existent in other countries. Even so, swap rates are not used as a benchmark, despite the fact that forward markets in other countries are larger and more liquid than the forward market for NOK/USD. The argument that NIBOR should be quoted as a currency swap rate because NOK liquidity is largely obtained in the forward market is, in Norges Bank's view, untenable since NIBOR is not traded. As high volatility makes NIBOR less robust to manipulation, finding a different construction that results in lower volatility should be considered. It has also been argued that volatility in NIBOR is high because the market for NOK is small, with low liquidity, and high price volatility in this market must therefore be expected. As shown in the discussion above, volatility in NIBOR is high because it is quoted via the swap market. Swap rates for other currencies are also volatile owing to high forward premium volatility (cf. the charts and table above). The unsecured interbank market in the three-to-six-month segment, which is the basis of the leading benchmark rates, is also virtually non-existent and relatively illiquid in other countries.

It may be of interest to compare the NIBOR rules with the framework in other countries. For example, the definition of LIBOR is the answer to the following question: *At what rate could you borrow funds, were you to do so by asking for and then accepting inter-bank offers in a reasonable market size just prior to 11 am? Furthermore, ...Contributions must be for the specific currency concerned and not the cost of producing the currency by borrowing in a different currency and obtaining the required currency via the foreign exchange markets...* Thus, the definition of LIBOR explicitly states that the rate must not be based on foreign rates.

In a report published on 12 November 2012, Sveriges Riksbank presents an in-depth discussion of STIBOR. The Swedish central bank points out a number of deficiencies and recommends various measures to improve quoting. Reference is made to interviews with panel banks, which show that these banks use information from the foreign exchange swap market when setting STIBOR: *"...The Stibor banks also state that they use the price of foreign exchange swaps when they set Stibor on a daily basis since their funding at the maturities in question often to a large extent consist of loans in the form of issued certificates in euro and dollar...."*¹⁴

¹⁴ See Sveriges Riksbank (2012), p. 45.

In other words, STIBOR banks reference the currency swap market in their STIBOR quoting, but as shown in Chart 7 above, STIBOR is considerably less volatile than the rate on SEK swapped from USD. This means that the high volatility in the SEKUSD forward premium does not directly affect STIBOR, and banks smooth out the fluctuations to make the benchmark rate more stable over time. The banks clearly use judgement to some extent here, which will always have to be the case in banks' estimates of interest rates that are not traded. The rules for STIBOR published by the Swedish Bankers' Association on 13 January 2013 now state that the benchmark interest rate should primarily be a traded SEK interest rate. Secondly, STIBOR should be calculated on the basis of several rates, where swap rates can be included in the data basis. Thus, STIBOR panel banks have always used swap rates as a basis for calculation, and will continue to do so, without allowing high forward premium volatility to have a direct effect on the benchmark rate. It is unclear why NIBOR panel banks cannot do the same as STIBOR panel banks. The five STIBOR panel banks are also members of the NIBOR panel.¹⁵

The Danish Bankers Association published a guide to CIBOR setting on 28 December 2012. CIBOR is the interest rate at which a financial institution is willing to lend DKK unsecured to a primary bank, with maturity from one week up to 12 months. The criteria included in CIBOR quoting are broad and can encompass various Danish and foreign rates, in addition to the rate on alternative investments, for example. This does not rule out the possibility of including swap rates in the calculation basis, but the Danish Bankers Association advises banks to apply a broad set of criteria when quoting CIBOR.¹⁶

In the attachment to the above-mentioned letter from FNO to Finanstilsynet of 8 February 2013, with a copy to Norges Bank, the swap construction is discussed in point c ii. As a proposed measure to strengthen the robustness of NIBOR without changing NIBOR itself, FNO refers to earlier drafts of the current rules in which calculating NIBOR as a currency swap rate was explicitly proposed. FNO writes (in point c ii):

"...Because the Norwegian market for unsecured loans and investments is not sufficiently large, banks shall base their interest rates on estimates of their own USD lending rates....This rate is converted to a corresponding NOK lending rate by correcting for the difference between the forward and spot exchange rates for NOK against USD for the relevant maturity..."

FNO has proposed inserting this addition into the current rules. The Bank has argued above that such a definition is undesirable. NIBOR volatility would remain high, exposing the benchmark rate to manipulation. In addition, it is the Bank's view that FNO's assertion that "... the Norwegian market for unsecured loans and investments is not sufficiently large..." is beside the point. As pointed out above, an unsecured interbank market in the segment 3-12 months is virtually non-existent in all countries and Norway is no exception. Even so, other countries, including Sweden and Denmark, have managed to find benchmark rates that are not pure currency swap rates.

¹⁵ With the exception of DNB, all NIBOR panel banks are also members of the STIBOR panel.

¹⁶ See Danish Bankers Association (2012b).

Another drawback of the swap construction is that risk premiums in other currencies can to a considerable extent affect the risk premium in NIBOR directly, even if NIBOR banks are not facing a higher risk (e.g. as measured by CDS prices). The risk premium is often measured by what is referred to as the interest rate premium, the difference between the benchmark rate and the expected key policy rate ahead.¹⁷ Assume that credit risk increases among banks that are dominant in the USD market. This may result in a higher interest rate premium in USD. Depending on forward exchange market developments between NOK and USD, the interest rate premium in NIBOR can also be affected, as observed in particular during the financial crisis in autumn 2008.¹⁸ This shows, however, that owing to the swap construction, the interest rate premium in NIBOR, and thus what is supposed to reflect the market's assessment of Norwegian banks' creditworthiness, can largely be determined by international credit risk and not the credit risk between banks that are active in the Norwegian money and foreign exchange markets (cf. the definition of NIBOR). When banks apply the Kliem USD rate, it is primarily risk premiums for European banks that are transmitted to NIBOR (cf. discussion in Section 1 and footnote 7). In the opinion of Norges Bank, a NOK interest rate that is not constructed as a currency swap rate will to a greater extent reflect the risk premium between banks that are active in the Norwegian money and foreign exchange markets. This will likely strengthen Norwegian financial markets.

In this connection, it should also be recalled that banks had to abandon LIBOR as the basis for NIBOR quoting in autumn 2008. LIBOR was perceived at the time as too low relative to actual market interest rates. An NOK rate swapped from LIBOR would have resulted in unrealistically low NIBOR levels.¹⁹ Given the manner in which NIBOR is constructed, it was necessary for banks to find a higher USD rate as a basis for NIBOR. Experience from autumn 2008 sows further doubt whether the swap structure is an appropriate basis for quoting the benchmark rate. This was most evident after the bankruptcy of Lehman Brothers in September 2008, when banks stated that they were not in a position to quote NIBOR because they did not know what the USD rate was. This shows that the swap construction is not especially robust.

Furthermore, reference is made to FNO's attachment to the above-mentioned letter, point c (at the bottom of page 2), which states that it is "*...very important for the definition of what NIBOR shall reflect to continue to apply to maintain continuity in existing contracts and avoid legal issues related to changes in the content of agreed benchmarks... ...Continuity means the NIBOR must continue to be based on interest rates banks state that they would charge a leading bank that is active in the Norwegian money and foreign exchange markets for unsecured loans in NOKThis requires, in turn, that NIBOR must continue to be based on the market where liquidity in NOK is traded in practice ...* (our emphasis).

¹⁷ The expected key policy rate is often measured using the OIS rate, which currently does not exist in the Norwegian market, and efforts should be made to establish this rate (cf. discussion in section 5 below).

¹⁸ This is also discussed in *Staff-Memo 21/2012*, Norges Bank.

¹⁹ The relationship between the USD and NOK premiums and the forward premium is discussed in "Risk premiums in NIBOR and other countries' interbank lending rates", *Staff-Memo 21/2012*, Norges Bank.

Norges Bank supports FNO's view that continuity means that NIBOR must continue to be based on rates banks state that they would charge a leading bank that is active in the Norwegian money and foreign exchange markets for unsecured loans in NOK. As long as this is complied with, it is the Bank's view that changes in what NIBOR is supposed to reflect in legal terms do not pose a problem. The Bank therefore disagrees that legal arguments can be made that NIBOR must continue to be based on the market where liquidity in NOK is traded in practice, i.e. the foreign exchange market. Under contract law, NIBOR is a quantity determined by a third party. When two parties to a contract agree to use NIBOR as a benchmark, they will also be in agreement that the content of this benchmark is subject to change over the term of the contract. This occurred, for example, as recently as in 2008 (cf. above, when banks switched from LIBOR to KlieM as a basis for their NIBOR quoting). It is thus difficult to see that a definition of what NIBOR is supposed to reflect might in itself result in "legal issues related to changes in the content of agreed benchmarks", as FNO appears to contend. In Norges Bank's view, legal issues are therefore not a valid argument for either keeping or abandoning the swap construction.

High NIBOR volatility can be a source of problems, even if the rate were not being manipulated. First, high benchmark rate volatility can itself weaken confidence in Norwegian financial markets. Various financial contracts are settled against NIBOR on a given day, and cash flows depend on conditions in the forward market at exactly the time NIBOR is quoted on that day. Wide daily fluctuations in the forward market make NIBOR less reliable, and financial market participants, particularly foreign participants at a greater distance from Norwegian markets, will in turn find it impossible to predict and difficult to understand what lies behind changes in NIBOR. The result may be that they will have misgivings about entering into contracts with NIBOR as a benchmark.

Second, high benchmark volatility can distort the transmission mechanism. Norges Bank sets the key policy rate (and the interest rate path) with a view to attaining monetary policy objectives. The central bank can counteract a general change in NIBOR owing to changes in interbank market risk premiums by changing the key policy rate and interest rate path accordingly. The interest rate premium will then be one of several factors affecting the key policy rate and the interest rate path. This is expressed in Norges Bank's account of how various macroeconomic factors affect the interest rate forecast in the period between two projection points.²⁰ In this way, Norges Bank seeks to neutralise the effect of changes in the premium on money market rates. Frequent fluctuations in the premium generate noise for this assessment and can make monetary policy more challenging. Neither changes in the key policy rate (and the interest rate path) or liquidity policy measures (to reduce the premium itself) are appropriate measures to counteract daily high volatility.

In order to set a benchmark interest rate that reflects the rate on unsecured interbank loans and that is not as volatile as the current rate, one possibility may be to set the rate in the same manner as LIBOR and EURIBOR, namely as a "response to a survey". Such a rate may be just as "correct", i.e. a reflection of realistic interest rates if trades had taken place, as a currency swap rate at which there are no trades

²⁰ See e.g. *Monetary Policy Report 3/2012*, discussion on page 20, Chart 2.

either (only one of the components is traded, the forward premium). Banks would then have to use a broader data set as the basis for quoting. Of course, this does not rule out the possibility of using swap rates as part of the basis (cf. the discussion of STIBOR and CIBOR above).

One objection may be that the benchmark rates LIBOR and EURIBOR were manipulated anyway; ergo, a “survey” may not produce a reliable benchmark either. However, the fact that the rate is derived from responses to a survey and is therefore not traded does not mean that the rate must have been manipulated. As long as banks’ contributions to the quoting are based on their best judgement – the rate they actually would have charged on loans to other banks – the rate could be a reliable benchmark.

To bolster confidence in NIBOR as a benchmark rate, banks should, in Norges Bank’s view, quote NIBOR in a different way, so that forward premium volatility does not directly affect it. As in other countries, banks should quote the benchmark rate on the basis of their best judgement of the rate they would charge on lending as described in the definition. Banks should base this judgement on developments in all relevant markets, including the CP/CD markets for other currencies such as USD and EUR and the forward exchange markets between NOK and these currencies. But the mechanical link to the forward exchange market should be eliminated. In the Bank’s opinion, such a change will increase confidence in NIBOR as a benchmark.

5. An assessment of possible alternatives to NIBOR, in particular alternatives based on actual financial market transactions, and, if possible, outlines of one or more alternative systems

In the ongoing international work on benchmark interest rates, it is regarded as important that such rates be traded in the market, since traded rates better reflect the actual cost of unsecured interbank loans. The dilemma is that there is virtually no trading in unsecured interbank loans beyond the shortest maturities. International benchmark rates in the three- and six-month segments have been therefore estimated in the absence of actual trades.

In NOK, there is activity in the unsecured interbank market overnight²¹ and in the forward exchange market for maturities of up to 12 months. There is neither a market for secured loans (repo market) nor an OIS market in Norway. One alternative could be yields on Treasury bills. However, Treasury bill yields are distorted by the characteristics of this market, such as high demand and low rates as a consequence of market participants’ search for safe investments. Turnover in the Treasury bill market varies widely over time and is very low in periods. Yields on these instruments fluctuate to a considerable degree with varying market conditions and are not appropriate as benchmark rates.

Establishing an OIS market in Norway would make a significant contribution towards making NIBOR quoting more transparent and clearer to market participants outside of the NIBOR panel. OIS stands for *overnight index swap*. This is an interest rate swap where the overnight rate constitutes the floating leg. The fixed rate in the interest rate swap (the OIS rate) reflects the expected overnight rate over the term of the contract. OIS markets exist in all countries that are comparable to Norway. In most countries, OIS

²¹ There is activity in this market owing to banks’ liquidity management requirements.

contracts are traded with terms ranging from a few weeks to up to one or two years, while in some countries OIS contracts exist with terms of up to ten years or even longer.²² Since the overnight rate is normally very close to the key policy rate, the OIS rate is a reliable expression of the expected key policy rate over the term of the OIS contract. This means, in turn, that OIS rates with different maturities provide a virtually risk-free yield curve. NIBOR comprises in principle a risk-free interest rate plus a risk premium on unsecured interbank loans. OIS rates help to shed light on the factors underlying changes in interbank rates: by comparing a change in three-month NIBOR with the change in a three-month OIS, non-panel market participants could observe whether the change in NIBOR is due to changed key rate expectations or a change in the risk premium. In the absence of an OIS market, it is impossible for market participants to separate these components. This makes it more difficult to understand what lies behind day-to-day changes in NIBOR.

In Denmark, OIS rates²³ have been introduced as an alternative benchmark in addition to CIBOR. The advantage of OIS rates as benchmark is that they are formed in a market where they are traded. This can make OIS rates harder to manipulate than traditional benchmark rates. The drawback of OIS rates as a benchmark is that they do not capture changes in banks' marginal borrowing costs owing to liquidity and credit premiums in the market.

A possible alternative to the current practice of applying a non-traded unsecured USD rate might be for banks to base NIBOR quoting on their actual unsecured USD borrowing rates. Several NIBOR panel banks issue CPs and CDs in USD and EUR, in part to fund assets in foreign currency and in part to obtain NOK funding via the currency swap market. CP/CD rates for USD reflect banks' actual USD costs, and a NOK rate swapped from CP/CD rates might therefore be said to reflect their NOK costs. CP/CD rates are lower than the unsecured USD rates on which banks currently base NIBOR. However, such a benchmark rate would be just as volatile as the current NIBOR rate on account of high forward premium volatility. It is because of high volatility that NIBOR is not robust to manipulation.

The interest rates at which trading actually takes place in the market do not appear at first glance to be adequate alternatives to NIBOR. The focus now should be on efforts to establish an OIS rate, which can eventually serve as a supplement to NIBOR and to change NIBOR quoting to reduce volatility. Together, these measures will make NIBOR more predictable and transparent than it is today and less open to suspicion of manipulation (cf. discussion in Section 4).

²² Markets for OIS contracts with such long terms are not necessarily very liquid.

²³ The Danish version of OIS is called CITA swaps, which uses the tomorrow-next rate on DKK as the floating leg. Prices for CITA swaps are required to be quoted at 11 am daily for maturities of one, two, three, six, nine and 12 months. A key element of the rules is that participants must keep a log of their daily reports. For more details, see <http://www.finansraadet.dk/presse/pressemeddelelser/2013/finansraadet-klar-med-ny-referencerente.aspx> (in Danish).

Appendix: Background to the letter from Norges Bank to Finanstilsynet of 20 March 2013 (this letter)

In a letter of **5 October 2011** from the Ministry of Finance to Norges Bank, the Ministry requests Norges Bank's

"... assessment of Finance Norway's new rules for setting NIBOR, including whether these measures are adequate to comply with the Financial Crisis Commission's recommendations, or whether further measures should be implemented. In that case, the Ministry requests a detailed account of what such measures should comprise and how they should be implemented...."

In its reply to the Ministry of **12 January 2012**, Norges Bank wrote:

"...Norges Bank will not rule out that the organisational structure pertaining to NIBOR setting may be a contributing factor to a lack of transparency in interest rate setting. Organisational and physical proximity between entities that furnish prices used as benchmark interest rates for financial contracts and entities that assume risk in the same market may give rise to a principal-agent problem. In Norges Bank's opinion, each NIBOR panel bank should have clear guidelines for identifying and dealing with possible conflicts of interest that may arise within and between banks that participate in interest rate setting. Such guidelines will help to ensure that NIBOR actually reflects the rate the bank would charge on lending in the money market. Norges Bank recommends that the Ministry of Finance request Finanstilsynet to consider directing NIBOR banks to draw up such guidelines..."

In a letter of **14 February 2012** from the Ministry of Finance to Finanstilsynet (with a copy to Norges Bank), the Ministry requests Finanstilsynet to assess a requirement for guidelines in line with Norges Bank's recommendation in the letter from Norges Bank to the Ministry of Finance dated 12 January 2012.

After meetings with Finanstilsynet, Norges Bank sent a letter to Finanstilsynet on **16 August 2012** ("Follow-up after meetings") in which Norges Bank discusses matters relating to NIBOR and complaints that the Bank had received.

On **31 August 2012**, Finanstilsynet sent a letter to the Ministry of Finance (with a copy to Norges Bank) as a reply to the Ministry's letter to Finanstilsynet of 14 February 2012.

In a letter of **14 December 2012** from the Ministry of Finance to Finanstilsynet ("Calculation of the NIBOR rate"), the Ministry of Finance requests Finanstilsynet, in consultation with Norges Bank, to examine a number of points, reproduced on page 1 of this attachment.

Norges Bank's letter to Finanstilsynet of **20 March 2013** (this letter) is Norges Bank's assessment of the points that the Ministry requested Finanstilsynet to examine and report on in consultation with Norges Bank in its letter dated 14 December 2012 and that Norges Bank, in consultation with Finanstilsynet, agreed to assess.

Overview of key international efforts to improve the quoting of benchmark interest rates

UK

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EU

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Norway

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