ARTICLE – A new reference rate – the way forward

Reference rates fulfil an important function in the financial system in Sweden and in other countries. They make it possible to standardise the pricing of financial products and are used by a number of different agents in financial markets. But in light of the global financial crisis which broke out in 2008 and the manipulation of the British reference rate LIBOR uncovered in 2012, the confidence in traditional reference rates has been damaged. This marked the start of comprehensive international reforms. In this article, we describe why the Riksbank has decided to start publishing a new reference rate for the shortest maturity in Swedish kronor. It also looks at international regulations and the work of other central banks in the area. Furthermore, we present outstanding issues which are being discussed internationally and which the Riksbank also needs to consider going forward. These issues include whether the new reference rates can also be created for longer maturities – and if so how that could be done, and how a transition from traditional to new reference rates could be effected.

Reference rates fulfil an important function in the financial system

A reference rate functions as a benchmark, or a basic value, when financial contracts are priced. Among other uses, reference rates are used in the pricing of interest derivatives, FX derivatives and bonds.[92] They are also used in the pricing of variable-rate loans aimed at households and companies. For example, a mortgage customer's contract terms can, in some countries, be designed as the reference rate at three months' maturity with an add-on for risk that is specific to the contract and which depends on, among other things, the size of the mortgage and the customer's income. The customer's costs for the loan go up if the reference rate rises, and down if the reference rate falls.

Traditionally, so-called interbank rates (Interbank Offered Rates, IBOR) are used as reference rates. IBOR are the rates that banks demand from each other for short-term uncollateralised loans. They therefore reflect the costs for banks of borrowing money. As banks need to fund their lending, it is reasonable that their costs for obtaining loans act as a base when pricing credit, and these costs are reflected in reference rates. However, traditional reference rates have been calculated based on offers made by banks or judgements of interest rates and not on actual transactions. Over time, banks have borrowed from each other (without collateral) to a lesser degree, which has led to fewer transactions on which to base offers on.[93]

In Sweden, the interbank rate STIBOR, Stockholm Interbank Offered Rate, is currently used as the reference rate. STIBOR is defined as the rates that the STIBOR banks[94] on average state that they can offer each other for uncollateralised loans in Swedish kronor. STIBOR is published for six different maturities within a time span of 24 hours (T/N) to six months. In total, STIBOR was in 2017 used as a basis in loans and financial contracts to an outstanding gross amount of about SEK 60,000 billion.[95] As reference rates have such a key function in financial markets, it is important that they are credible and transparent.

Reduced confidence globally for reference rates after the financial crisis of 2008-09

During the global financial crisis that broke out in 2008, liquidity on the interbank market was further impaired and this led to uncertainty among agents as to whether reference rates really did reflect market conditions. When transactions are few, the banks contributing input data need to make a judgement of what would be a reasonable interest rate for uncollateralised loans at the relevant maturity in the prevailing market situation. This judgement becomes the bank's reported offer, which later forms the basis of the calculation of the reference rate.

When reference rates are calculated based on reported offers, there is also a risk of manipulation. During the LIBOR scandal of 2012, it was revealed that several international banks had manipulated the LIBOR reference rate for their own benefit, or for the benefit of individual

[92] A derivative instrument is a security whose value is linked to the value of an underlying asset, such as currencies, interest rates or commodities.

[93] When there are few interbank transactions, banks that are to submit offers must instead use the costs for their other sources of funding as a basis for their assessment of what would be a reasonable interbank rate.

[94] The STIBOR banks are Danske Bank, Handelsbanken, Länsförsäkringar Bank, Nordea, SBAB Bank, SEB and Swedbank.

[95] Around SEK 4,000 billion of this comprised loans to households and companies in 2017. Source: Finansinspektionen, Reference rates are changing, *FI Analysis*. 14, Nov 2018. Today, however, STIBOR is not used as a base in lending to households; on the other hand it is often used in corporate loans and loans to tenant owner associations.

employees. LIBOR is not just a reference rate for the British pound but is also calculated for several other currencies, including the US dollar (USD LIBOR). British and US authorities fined several banks as a result of the LIBOR scandal. This scandal, as well as the fact that the number of interbank transactions had decreased over time, damaged confidence in traditional reference rates globally.

International principles and regulatory frameworks to promote the reliability of reference rates

Several international initiatives have been taken to strengthen confidence in and the reliability of reference rates. The International Organization of Securities Commissions (IOSCO) issued a report in 2013 that include 19 principles.[96] The principles cover, among other aspects, the data that should form the basis of reference rate calculations, documentation and transparency of the calculations, and requirements for administrators to monitor and oversee control systems and routines. Later the same year, the Financial Stability Board (FSB) was tasked with continuing the work to review the reference rates. The FSB made two main recommendations: firstly that IBOR should be reformed (so that actual transactions were used to a higher degree as a basis for the calculations), and secondly that alternative (entirely transaction-based) reference rates would be developed as a complement to IBOR.

IOSCO's principles and the FSB's recommendations on reforming IBOR later formed the basis of the regulatory framework for reference rates that Swedish market agents are obliged to follow, namely the EU's Benchmark Regulation (BMR)[97], which came into force in 2018. This regulation imposes requirements on both the banks contributing input data and the agents who calculate and publish a reference rate based on the contributed input data. Under the regulation, the agent appointed to administrate the reference rate should, where possible, use transaction-based data as a basis when calculating the rate. However, the regulation points out that this is sometimes not possible or appropriate, especially if there are few actual transactions at the maturity in question. Expert judgements are therefore still permitted, but the regulation imposes special requirements on contributors who use this method when IBOR is calculated.

Other central banks have undertaken to publish new reference rates

In line with the FSB's recommendation to develop transaction-based alternative reference rates, several central banks have taken on the responsibility of publishing new reference rates at the shortest maturity. Such rates have been judged to be the most reliable as more interbank transactions are made with short maturity than with long maturity (or, in other words, banks borrow money from each other at short rather than at long maturity). Since the spring of 2018, for example, the central banks in the United Kingdom and the United States have published new transaction-based reference rates called SONIA (Sterling OverNight Indexed Average) and SOFR (Secured Overnight Financing Rate) respectively. Since the autumn of 2019, the ECB also publishes a transaction-based reference rate called €STR (Euro Short Term Rate). The central banks in Japan and Canada also calculate and publish a new transaction-based reference rate, see table 6.

Table 6. International reference rates; old and new

Old reference rate	New reference rate	Maturity	Administrator
CORRA	Enhanced CORRA	O/N	Bank of Canada
GBP LIBOR	SONIA	O/N	Bank of England
JPY LIBOR & TIBOR	TONAR	O/N	Bank of Japan
EURIBOR & EONIA	€STR	O/N	The ECB
USD LIBOR	SOFR	O/N	Fed New York
STIBOR	*"Name"*	*O/N*	*The Riksbank*

Note. The Riksbank's new reference rate has not yet been given a name.
Source: Central bank websites

The new reference rates have started to be used in derivative contracts and on securities markets, and their use is increasing. On the UK derivative market, for example, the share of swaps already using SONIA as a base is broadly equivalent to the share using LIBOR as a base. Use of the new reference rate is also increasing in the United States. A notable example is the first SOFR-based securitisation of mortgages issued by Ginnie Mae in the spring of 2019 (*Real Estate Mortgage Investment Conduit, REMIC)*. SOFR is also used in variable-rate bonds. The total value of such bonds exceeds USD 300 billion.[98]

[96] The principles were adopted by both the FSB and the G20 in the autumn of 2013.
[97] Regulation (EU) no. 2016/1011 of the European Parliament and of the Council of 8 June 2016 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of mutual funds and amending Directives 2008/48/EC and 2014/17/EU and Regulation (EU) No 596/2014.
[98] *FSB Reforming major interest rate benchmarks: Progress report*, December 2019. Financial Stability Board.

However, the transition to new reference rates is proceeding more slowly in lending markets. For example, LIBOR is still the main rate used for loan products in the United Kingdom.

Going forward, the Riksbank will start to publish a new reference rate for the shortest maturity

In December 2019, the Riksbank decided to start calculating and publishing a new reference rate in Swedish kronor. The preliminary timetable announced at that time was that a new provisional reference rate would start to be published during the first half of 2020, and then start to publish the final reference rate during the second half of 2020. As a result of the effects of the coronavirus pandemic on the Swedish economy and in Swedish financial markets, the trial period and publication of the reference rate has been postponed. The new reference rate will instead be introduced when the conditions are better for it to be afforded the necessary commitment from and scrutiny by the market during the trial period. The Riksbank will give plenty of notice before starting to publish a provisional rate.

The new reference rate will be for the shortest maturity, i.e. the rate paid by participants when they borrow from each other on the overnight market (O/N). The Riksbank's decision to start calculating and publishing a new reference rate had been preceded by a consultation round which provided positive responses from all respondents.[99]

The reason why the new reference rate will refer to the shortest maturity is because it needs to be based on as many transactions as possible in order to be credible. The Riksbank wants to avoid a situation where only a few transactions or participants dominate the entire rate-setting process. In Sweden, the most transactions and the largest loan volumes occur on the overnight market, where banks and other participants borrow from each other. As mentioned above, it is also the international standard for central banks that have started to publish reference rates to do so for the very shortest maturity.

The Riksbank's new reference rate corresponds most closely to STIBOR's shortest rate that has the maturity next banking day to the day after (*tomorrow/next*). An important difference is that the STIBOR rates are still calculated based on the banks' offers, which, when there are no transactions, consist of the banks' judgements, whereas the Riksbank's new reference rate will only be calculated based on actual transactions.

A short reference rate does not fully meet the needs

The advantage of the new reference rates is that they are fully transaction-based and that there is therefore no need for judgements. But as the new reference rates are transaction-based, they have very short maturities. As previously mentioned, not enough transactions are currently made for it to be possible to calculate the new reference rate for maturities longer than the very shortest. This applies not only in Sweden, but also in many other countries. This means that the new reference rates cannot directly replace traditional reference rates, as the latter also exist for longer maturities.

If new reference rates are to be able to fully replace current reference rates (IBOR) in the future, the new rates will probably also need to be developed for longer maturities. Considerable work is being done on this issue internationally. As far as Sweden is concerned, the STIBOR reference rate is used primarily with a three-month maturity, the rate that occurs in most financial contracts.[100] In the future, therefore, requests may also be made in Sweden for the new reference rate to be provided for longer maturities. In that case, a Swedish method for this should, if possible, be in line with the international practice being developed.

Different methods for creating longer reference rates

Creating longer transaction-based reference rates is not exactly straightforward, however. For them to be reliable, they not only have to be based on actual transactions, but also on *a sufficient number of* actual transactions. International discussions on how the new short reference rates can be used to create reference rates for longer maturities have resulted in two main tracks: compounded rates and forward-looking rates based on traded derivative contracts.

Compounded rates

One way of creating longer reference rates is to calculate *compounded rates* based on short reference rates. This involves calculating a composite rate (also called compound interest) of, for example, the last three months' interest rate outcomes. The advantage of this method is that it is easy to calculate such an interest rate. However, there are different ways of doing the calculation. The result can vary, for example, due to rounding-off or different ways of dealing with public holidays. This could indicate that the administrator who provides the overnight rate should also provide a common method for the market in order to calculate compounded rates based on interest-rate history.

[99] A consultation from Sveriges Riksbank, *The Riksbank's role in providing a reference rate*, Document no. 2019-00912.

[100] STIBOR's annual report 2019. Financial Benchmarks Sweden.

The disadvantage of compounded rates is that someone borrowing money with, for example, a maturity of three months only finds out their financing costs on the due date three months later. This can be compared with someone who takes a loan with three months' IBOR as its base. They already know from the start the total amount to be repaid in three months' time, as the interest rate is known in advance.

Forward-looking rates

The other way of creating longer reference rates is to use traded derivative contracts in the calculation. In such a derivative contract, one party pays the short-term interest and the other pays a fixed rate with a longer maturity, for example three months' interest.[101] The price (the interest) for giving a three-month loan reflects market expectations of how the shortest interest rate will develop over the next three months. To be able to calculate a reliable forward-looking rate, there must be a sufficient volume of trading in derivatives.

The advantage of forward-looking instead of compounded rates is that the payment flows are known in advance. A new forward-looking reference rate would thereby have maturities that correspond better to currently used reference rates (including STIBOR). The disadvantage is that the derivative markets both in Sweden and in most other countries are not currently large enough to be able to form the basis of reliable forward-looking reference rates.

As use of the new reference rate for the shortest maturity becomes more widespread, it may increase the demand for new derivatives. It cannot be ruled out, therefore, that a future derivative market, with its base in the Riksbank's new reference rate, could be bigger than today's derivative market. If demand is sufficiently large, it may be possible in the future to calculate and publish forward-looking reference rates for longer maturities based on these derivatives.

Several central banks are working on developing new reference rates for longer maturities

The US Federal Reserve started in March 2020 to publish compounded reference rates for maturities of one, three and six months and an index (30-, 90-, and 180-day "SOFR averages" and a "SOFR index").[102] At the same time, the United States and other countries have expressed plans to promote growth in derivative markets that would enable a forward-looking rate to be calculated in the future.[103]

In the United Kingdom, the Bank of England's assessment is that the derivative market will be large enough to enable a forward-looking rate to be calculated. But the bank also points out that there are indications from the market that a forward-looking rate is nevertheless not the most desirable option. The use of compounded rates is seen as a simpler solution which provides a sufficient degree of certainty about future payments in the vast majority of cases. As from July 2020, the Bank of England will start publishing an index that will enable market participants to calculate compounded rates for various selected maturities based on historical rates.[104]

To sum up, a standard is starting to emerge among central banks whereby they will also calculate and publish compounded rates based on the new reference rate.[105]

The future for traditional reference rates is uncertain

One outstanding issue under discussion internationally is what the future looks like for traditional reference rates, that is STIBOR and other IBOR, in light of the advent of the new reference rates. Part of this issue is how IBOR can be phased out in practice in light of their use in many long-term contracts, and the large volumes involved. The transition needs to take place in a controlled way.

The responsible authorities in the United Kingdom have stated that the new reference rate is not just a complement to LIBOR but will replace it entirely. The UK authority that exercises supervision over LIBOR, the Financial Conduct Authority (FCA), has announced that it will require banks to submit offers for the LIBOR calculation after 2021. This announcement probably means that LIBOR will not be published after 2021 (as several of the banks that submit offers to LIBOR have been fined, the incentive to contribute offers has declined). The Bank of England has also acted to support the transition from LIBOR. As from the start of the third quarter of 2021, for example, the Bank of England, in its lending to commercial banks, will apply higher haircuts on collateral that is linked to LIBOR.[106] As from the end of 2021, the Bank of England will no longer accept LIBOR-linked collateral.[107] The Bank of England has also announced that it will consider using supervisory tools to

[101] There are currently what are known as STINA swaps, where the parties replace the base STIBOR tomorrow/next with, for example, a fixed three-month rate. In the future, such a swap contract could be established but with the base replaced with the Riksbank's reference rate with maturity overnight.

[102] Federal Reserve Bank of New York's website, 12 February 2020. See the link: https://www.newyorkfed.org/markets/opolicy/operating_policy_200212#footnote1.

[103] See, for example the link: https://www.federalreserve.gov/newsevents/speech/quarles20180719a.htm.

[104] Bank of England, Andrew Hauser (Executive Director, Markets), *Turbo-charging sterling LIBOR transition: why 2020 is the year for action – and what the Bank of England is doing to help*, 26 February 2020.

[105] The local working group for new reference rates in Switzerland has also recommended the creation of longer rates by calculating the compounded rates, and, wherever possible, to use these instead of CHF LIBOR. The administrator of the reference rate states on its website that it will publish an index to calculate the SARON reference rate for longer maturities, compounded for longer maturities.

[106] Bank of England website, updated 7 May 2020. See the link: https://www.bankofengland.co.uk/markets/eligible-collateral.

[107] Bank of England, Andrew Hauser (Executive Director, Markets), *Turbo-charging sterling LIBOR transition: why 2020 is the year for action – and what the Bank of England is doing to help*, 26 February 2020.

encourage the transition from LIBOR if it is progressing too slowly. In mid-March 2020, the FCA, the Bank of England and the local UK working group for alternative reference rates announced that the overall timetable for phasing out LIBOR remains in place, which means that participants cannot rely on LIBOR being published after 2021.[108] On the other hand, the spread of the coronavirus has means that various elements in this phasing out process have been delayed.[109]

Representatives of the US Federal Reserve have also pointed out the importance of the use of LIBOR in dollars being replaced by new reference rates in good time before the end of 2021.[110]

In the euro area, the traditional reference rate for longer maturities (EURIBOR) will remain but will be calculated using a new method. However, the existing reference rate for the shortest maturity (EONIA) will disappear and be replaced by the new €STR reference rate.[111] Other countries where the authorities currently consider that traditional rates should not be replaced but remain in parallel with the new rates include Australia, Canada and Japan.[112]

In Sweden, no decisions have currently been taken to stop publishing STIBOR. Under the Benchmarking Regulation (BMR) and in its capacity as a critical reference rate, STIBOR must be authorised before the end of 2021. FI decides whether STIBOR and its administrator fulfil the requirements of the BMR and can thereby be authorised.

To sum up, IBOR and the new reference rates will probably exist side by side in the coming years.

The way forward in Sweden

Internationally, confidence in traditional reference rates has been damaged and in response to this, work is ongoing in many countries to replace, or complement, these rates with new transaction-based reference rates. Swedish financial markets have a substantial amount of cross-border trade and are therefore very dependent on how foreign markets function. Sweden cannot ignore the global trend of using new transaction-based reference rates. The framework for Swedish reference rates must instead be adapted to the changes abroad. One such adaptation is the Riksbank publishing a new reference rate for the shortest maturity in the future, similar to several other central banks around the world. The new reference rate is based entirely on transactions in contrast to STIBOR, which is based on offers.

Once the Riksbank starts to calculate and publish the new reference rate, it will have taken a first step to complementing STIBOR. It should be possible to use the new reference rate in all contracts where a reference rate for the shortest maturity is a suitable base. If the new reference rate is considered more credible and robust, it can thus replace STIBOR on the shortest maturity.

To begin with, it is primarily market demand that will dictates how broadly the new reference rate is used. One immediate area of use in the near term is as a “fall-back rate” in contracts. The Benchmarking Regulation requires a plan in case the reference rate used in the contract (for example STIBOR) stopped being produced; a means of observing the requirement to have another interest rate to fall back on.

Another area of use is in trade in foreign exchange instruments. If a bank trades in FX instruments where one payment leg in the transaction is linked to a new foreign reference rate, it is probable that the counterparty will demand that that the Swedish leg in the transaction is also linked to a corresponding new Swedish reference rate. The Swedish Bankers' Association working group for alternative interest rates takes a positive view of Sweden also having a transaction-based reference rate so that Sweden can still do business with parties in the major currency areas, where new reference rates have been developed.[113] STIBOR is not comparable with, for example, SONIA or SOFR, but the Riksbank’s new reference rate will be.

Going forward, the Riksbank will need to consider two outstanding issues: firstly, longer maturities for the new reference rates, and secondly, how the transition to the new reference rates will take place. The Riksbank will constantly follow and participate in international discussions on the development of international practice in these areas. If, going forward, there is considered to be a need for a longer reference rate for the market in Swedish kronor, it appears that a pragmatic solution would be to start by publishing compounded rates, as the central banks in the United Kingdom and the United States do.

[108] See https://www.fca.org.uk/news/statements/impact-coronavirus-firms-libor-transition-plans.

[109] See https://www.bankofengland.co.uk/-/media/boe/files/markets/benchmarks/rfr/rfrwg-further-statement-on-the-impact-of-coronavirus-on-timeline-for-firms-libor-transition-plans.pdf.

[110] New York Fed, John Williams (Chief Executive Officer), Remarks at Securities Industry and Financial Markets Association (SIFMA), 15 July 2019.

[111] EONIA is the traditional reference rate for the shortest maturity (overnight). EURIBOR is the traditional reference rate for slightly longer maturities, it is published for the maturities of one and three weeks respectively and six and twelve months respectively.

[112] FSB, *FSB Reforming major interest rate benchmarks, progress report,* December 2019.

[113] See the Swedish Bankers' Association website, the AGAR (Working group for alternative interest rates) tab.