

New benchmark rates, new challenges: introducing the €STR in the euro area

Sweeping changes to important interest rate benchmarks have been posing major challenges particularly to the financial sector, but also to firms and households. To wit, the introduction of the new reference rate €STR (Euro Short-Term Rate) is impacting directly on existing and future financial contracts as well as operational and other processes.

Interest rate benchmarks represent key references for many types of financial contracts, such as floating rate loan contracts and interest rate derivatives. They are, furthermore, used for the valuation of financial products. Benchmark rates are therefore used by banks and other financial institutions as well as by firms and households (for retail mortgages, for instance).

Manipulations of benchmark rates in past years and a considerable decline in turnover in the underlying money markets have triggered a reform process which is taking place in all major currency areas. In Europe, this process culminated in the EU Benchmarks Regulation, which entered into force in 2018. This regulation was a catalyst for specific changes to the two most important euro benchmark rates: EONIA (Euro OverNight Index Average) and EURIBOR (Euro Interbank Offered Rate). Users of LIBOR (London Interbank Offered Rate) also need to prepare for material change.

The action necessitated by the superseding of EONIA by the €STR is considerable: by the end of 2021, market participants will have to migrate all products and contracts referencing EONIA to the €STR. The first €STR products, such as interest rate swaps, are already being traded, though their market share is still at a very low level. The term benchmark EURIBOR has been thoroughly reformed and now meets the requirements of the EU Benchmarks Regulation. However, market participants have to include fallbacks in their contracts which would be triggered if the original reference rate is discontinued permanently. The available basis for this is the €STR. Moreover, users of LIBOR – to date the most important interest rate benchmark for the US dollar, pound sterling, Swiss franc and Japanese yen – have to make preparations for its discontinuation after 2021 and instead use other benchmark rates in future. This will also affect euro area market participants using LIBOR as a reference interest rate particularly for their foreign currency operations.

The fundamental change in benchmark rates requires close dialogue between the public and the private sector. Central banks are playing an active role in this process, by providing new reference rates or by supporting work in this area by private sector working groups. Nonetheless, it is up to market participants to develop suitable solutions and implement them in a timely manner. Going forward, too, it will therefore be important to strike the right balance between private sector responsibility and public sector support.

Importance and design of interest rate benchmarks

Interest rate benchmarks play a significant role in the financial system

An interest rate benchmark, also known as a reference rate or benchmark rate, refers to a specific financial market segment for which it is intended to be a representative reflection of the prevailing market rates. In most cases, they are specifically aimed at representing banks' average refinancing costs in the money market, or a segment thereof. Benchmark rates play a significant role in the financial system, as they are often used as references in floating rate financial instruments and contracts.¹ They are used in products such as interest rate derivatives, money market instruments, floating rate securities and loan contracts. In addition, the prices of liquid interest rate derivatives based on benchmark rates are used for the valuation of financial instruments. Benchmarks are therefore relevant to many different market actors, not only banks and other financial institutions but also firms and even households, for example regarding floating rate loans (including retail mortgages), deposits or securities. The markets for financial instruments which reference a benchmark rate are, in most cases, significantly larger than the respective money market segment underlying the reference rate, in terms of outstanding volume and number of contracts. This is especially true of derivatives markets, which are of major significance for financial market participants' interest rate risk management.²

EONIA and EURIBOR most used euro benchmark rates

Since the introduction of the euro, the two most important euro benchmark rates have been EONIA (Euro OverNight Index Average) and EURIBOR (Euro Interbank Offered Rate), the latter being a term rate provided for tenors ranging from one week to 12 months. Both rates are published daily and are administered by the European Money Markets Institute (EMMI), an association supported by commercial banks and based in Belgium. The key global benchmark LIBOR (London Interbank Offered Rate), which is published for various tenors and currencies by the UK-based ICE Benchmark Administration (IBA), also features a euro-

denominated rate (EUR LIBOR). This rate, however, is of minor importance compared with EURIBOR. The extent of the use of benchmark rates can only be approximated since the relevant data are not systematically gathered or are gathered only for individual market segments. In 2016, the European Commission estimated that EURIBOR underpinned a notional value of more than €180 trillion in outstanding contracts (mostly interest rate swaps).³ An estimated more than €1 trillion of this figure covers floating rate retail mortgages. The importance of such retail mortgages varies significantly between euro area countries. It tends to be small in Germany, where fixed interest lending is predominant. As regards the use of EONIA, the European Central Bank (ECB) in 2018 estimated that a notional amount of €22 trillion of EONIA-linked derivatives contracts were currently outstanding.⁴ In 2017, the European Commission estimated the outstanding amounts of money market instruments in the unsecured and the secured market which reference EONIA at a minimum of €450 billion and €400 billion, respectively.⁵ Owing to the use of EONIA-based interest rate derivatives for the valuation of financial instruments, however, the importance of EONIA extends far beyond the contracts captured in the aforementioned figures.

¹ If a contract is based on a reliable benchmark rate, neither party can influence the agreed rate of interest. The value of a contract thus remains impartial and indisputable (see ECB (2019a)).

² It needs to be noted here that the volume of interest rate derivatives transactions cannot be compared directly with the volume of loan or securities transactions since, for interest rate derivatives, the notional amount is not the amount exchanged.

³ See Commission Implementing Regulation (EU) 2016/1368 establishing a list of critical benchmarks used in financial markets pursuant to Regulation (EU) 2016/1011 of the European Parliament and of the Council. In 2014, the Financial Stability Board estimated the notional outstanding amount of contracts referencing EURIBOR at around US\$150 trillion to US\$180 trillion. By contrast, the use of EUR LIBOR, at an estimated volume of US\$2 trillion, was significantly lower (by comparison: the total notional outstanding amount of contracts referencing LIBOR was estimated at US\$220 trillion). See FSB (2014).

⁴ See Coeuré (2018).

⁵ See Commission Implementing Regulation (EU) 2017/1147 of 28 June 2017 amending Commission Implementing Regulation (EU) 2016/1368 establishing a list of critical benchmarks used in financial markets pursuant to Regulation (EU) 2016/1011 of the European Parliament and of the Council.

| Design of selected interest rate benchmarks | | | | |
|---|--|---|---|--|
| Features | €STR (Euro Short-Term Rate) | EONIA (Euro OverNight Index Average) | EURIBOR (Euro Interbank Offered Rate) | LIBOR (London Interbank Offered Rate) |
| Currency | EUR | EUR | EUR | CHF, EUR, GBP, JPY and USD |
| Administrator | European Central Bank (ECB) | European Money Markets Institute (EMMI) | European Money Markets Institute (EMMI) | ICE Benchmark Administration (IBA) |
| Data sources | Transaction data collected under money market statistical reporting | Previously: transaction- based submissions by panel banks Currently (since October 2019): calculated as €STR plus a spread of 8.5 basis points | Previously: submissions by panel banks based on expert judgement (quotes) Currently (since November 2019): submissions by panel banks based on trans- actions as well as expert judgement (if not enough trans- actions available) | Previously: submissions by panel banks based on expert judgement (quotes) Currently (since April 2019): submissions by panel banks based on trans- actions as well as expert judgement (if not enough trans- actions available) |
| Underlying market segment | Unsecured money market | Previously: unsecured interbank money market Currently (since October 2019): unsecured money market | Previously: unsecured interbank money market Currently (since November 2019): unsecured money market | Previously: unsecured interbank money market Currently (since April 2019): unsecured money market |
| Tenor | Overnight | Overnight | 1 week, 1 month, 3, 6 and 12 months | Overnight/spot next, 1 week, 1 month, 2, 3, 6 and 12 months |
| Publication | Since 2 October 2019 | 4 January 1999 to 3 January 2022 | Since 30 December 1998 | Since 1986 (by IBA since February 2014) |
| Deutsche Bundesbank | | | | |

New euro reference rate €STR introduced in October 2019

Since October 2019 the ECB has been publishing a new euro reference rate, the €STR (Euro Short-Term Rate).⁶ The introduction of the €STR is part of an extensive overhaul of benchmarks which is currently ongoing in all major currency areas. The manipulation of various benchmark rates and the considerable decline in liquidity in the underlying money market segments indicated a need for fundamental reform. This led the public sector to develop new international standards for the production and use of benchmarks. These standards have also been enshrined in European legislation. Benchmark rates should be grounded, where possible, in a sufficient quantity of actual transac-

tions in liquid markets. These requirements also necessitated changes to EONIA and EURIBOR. In the past, both rates were based on the unsecured interbank money market. They were calculated on the basis of data voluntarily reported by a group of contributing banks, known as panel banks. Although data submitted to EONIA were transaction-based, they most recently reflected only a very low daily trading volume of around €2 billion. EURIBOR, like LIBOR, was based on submissions of non-binding quotes relying on expert judgement

⁶ The ECB in March 2019 changed the acronym from ESTER to €STR (see ECB (2019b)).

rather than actual transactions. EMMI has since reformed EURIBOR, which is now calculated using a new methodology. Since the introduction of the €STR, EONIA has no longer been based on data reported by panel banks. Instead, EMMI has pegged the calculation of EONIA directly to the €STR. Publication of EONIA will be discontinued in January 2022, the deadline by which the €STR will have fully replaced EONIA for all purposes.

Article provides overview of current developments

The purpose of this article is to provide a comprehensive overview of efforts to reform interest rate benchmarks over the past few years. It will start by explaining the background to these developments and the role played by the public sector, including central banks. The €STR and what its introduction means for EONIA and EURIBOR will subsequently be discussed in further detail. In this context, attention will also be given to developments regarding LIBOR in order to show parallels and differences to the changes in the euro area. The article will conclude by looking ahead to the tasks that remain to be done.

Need for reform and establishment of new global standards

Need for benchmark reform on a global scale led to development of new standards ...

The representativeness and integrity of existing interest rate benchmarks were increasingly being called into question in past years. This was triggered by news of manipulations, particularly in connection with LIBOR and EURIBOR.⁷ First, there were incidences of contributing panel banks understating their borrowing costs in their submissions. Second, some colluded on their submissions to move the benchmark rate in a way that worked to their advantage.⁸ In addition, liquidity in the unsecured interbank market had dropped significantly since the financial crisis. This can be attributed to increased aversion to credit risk but also to the excess liquidity generated by monetary policy measures as well as changes in banking regulation.⁹ The public sector responded by establishing new standards gov-

erning the production of benchmarks.¹⁰ Notably, in 2013 the International Organization of Securities Commissions (IOSCO), a global association of securities regulators which sets global standards for securities market regulation, published its Principles for Financial Benchmarks.¹¹ The IOSCO Principles encompass the areas of governance, quality of the benchmark and of the methodology, and accountability.

The significant role that benchmarks play within the financial system can give rise to risks to financial stability. In order to ensure that benchmark rates are robust and appropriately used, the G20 tasked the Financial Stability Board (FSB) with coordinating global reform efforts. In July 2014 the FSB issued two fundamental recommendations in this regard: strengthening existing benchmarks, and developing alternative, nearly risk-free rates (RFRs). Reformed or new benchmark rates should be anchored in observable transactions, wherever feasible, and should be robust even in the face of market dislocation. They should also minimise the opportunities for manipulation.¹² This led to the formation of working groups in several currency areas to identify RFRs and map out paths for transitioning from existing benchmark rates to RFRs. Although these working groups were generally established by the public sector, their members generally belong to the private sector.¹³ Their results are mostly published as rec-

... and identification of alternative, risk-free rates

⁷ See IOSCO (2013).

⁸ See BIS (2019).

⁹ See, for example, Deutsche Bundesbank (2019) and ECB (2019c).

¹⁰ These standards cover not only interest rate benchmarks but also other types of benchmarks, including those referencing equity, commodity or energy markets. These are not covered in this article, however.

¹¹ See IOSCO (2013). Recommendations for regulating LIBOR (see Wheatley (2012)) and principles for benchmark-setting processes in the EU (see ESMA and EBA (2013)) had already been published beforehand.

¹² See FSB (2014).

¹³ For instance, Working group on euro risk-free rates in the euro area, Alternative Reference Rates Committee (ARRC) in the USA, Working Group on Sterling Risk-Free Reference Rates in the UK, National Working Group on Swiss Franc Reference Rates (NWG) in Switzerland, and Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks (previously Study Group on Risk-Free Reference Rates) in Japan.

ommendations. These recommendations are frequently preceded by public consultations in order to achieve broad market acceptance. Moreover, in July 2016 the Official Sector Steering Group (OSSG)¹⁴ of the FSB asked the International Swaps and Derivatives Association (ISDA) to lead work to improve the robustness of derivatives contracts.¹⁵ The focus of this work across currencies (including the euro) is particularly on the inclusion of contractual fallback provisions which would be triggered if a benchmark rate is permanently discontinued.¹⁶ The FSB does not deem it necessary to use benchmark rates that include risk premia (such as for bank credit risk) for certain financial transactions (especially the majority of derivatives transactions). In its view, for financial stability reasons an RFR should be used instead.¹⁷ The work of ISDA is therefore focused on the use of RFRs.

materially changes or ceases to be provided. These plans must be reflected in contractual relationships with clients. Contracts entered into prior to January 2018 must be amended accordingly where feasible and on a best-effort basis.²¹ The competent authority responsible for supervising market participants domiciled in Germany is the Federal Financial Supervisory Authority (*Bundesanstalt für Finanzdienstleistungsaufsicht*, or BaFin).

■ Role of central banks

Benchmarks are used throughout the financial industry and can also be provided by the private sector, as is the case for EONIA and EURIBOR, for instance. However, manipulations, the more stringent international requirements for contributors to benchmarks and the associated legal risks have significantly dampened banks' willingness to contribute to the production of reference rates in recent years. For instance, 26 banks have left the EURIBOR panel since 2012, taking the current total to 18. Over the same period, membership of the EONIA panel fell by 15 to 28 banks at last count. Unsecured trading

Provision of interest rate benchmarks increasingly difficult for private sector providers

International standards enshrined in EU legislation

In the European Union, the EU Benchmarks Regulation (BMR) entered into force on 1 January 2018.¹⁸ The BMR, based on the IOSCO Principles, stakes out a regulatory framework comprising an extensive body of rules governing the administrators (i.e. the entity responsible for the production) and contributors to benchmarks as well as the use of these benchmarks. For benchmarks which – owing, for instance, to widespread use – are considered to be critical to market integrity, financial stability or consumer protection, additional requirements apply. For instance, from 1 January 2022 critical benchmarks which do not comply with the BMR will no longer be permitted to be used in newly concluded contracts.¹⁹ The relevant competent authority can require mandatory administration of, or contributions to, critical benchmarks for a period of up to five years. In August 2016, the European Commission declared EURIBOR a critical benchmark; it did the same for EONIA in June 2017.²⁰ At the time, neither of the two benchmarks met the requirements of the BMR. Moreover, supervised entities which use benchmarks have been required, since 1 January 2018, to produce “robust written plans” setting out the actions they would take if a benchmark they are using

¹⁴ The OSSG comprises representatives of central banks and regulatory authorities.

¹⁵ ISDA is an association of market participants which develops standardised contracts for derivatives transactions.

¹⁶ See FSB (2017).

¹⁷ See FSB (2014).

¹⁸ Regulation (EU) 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 investment funds and amending Directives 2008/48/EC and 2014/17/EU and Regulation (EU) No 596/2014, as amended by Regulation (EU) 2019/2089 of the European Parliament and of the Council of 27 November 2019 amending Regulation (EU) 2016/1011 as regards EU Climate Transition Benchmarks, EU Paris-aligned Benchmarks and sustainability-related disclosures for benchmarks. The regulation is currently undergoing regular review. To this end, a public consultation was conducted by the European Commission (see European Commission (2019)).

¹⁹ Existing contracts may reference such benchmarks only under certain circumstances and where permitted by the competent supervisory authority (see Article 51(4) of BMR). Prior to the amendment of the BMR in November 2019, the transitional period was scheduled to expire on 1 January 2020.

²⁰ See Commission Implementing Regulation (EU) 2016/1368 of 11 August 2016 and Commission Implementing Regulation (EU) 2017/1147 of 28 June 2017.

²¹ See ESMA (2019).

Selected risk-free reference rates

| Features | €STR (Euro Short-Term Rate) | SARON (Swiss Average Rate Overnight) | SOFR (Secured Overnight Financing Rate) | SONIA (Sterling Overnight Index Average), reformed | TONA (Tokyo Overnight Average rate) |
|------------------------------|-----------------------------------|--|---|---|---|
| Currency | EUR | CHF | USD | GBP | JPY |
| Administrator | European Central Bank | SIX Swiss Exchange | Federal Reserve Bank of New York | Bank of England | Bank of Japan |
| Underlying market segment | Unsecured money market | Secured interbank money market | Secured money market | Unsecured money market | Unsecured money market |
| Tenor | Overnight | Overnight | Overnight | Overnight | Overnight |
| Publication | Since October 2019 | Since August 2009 | Since April 2018 | Since April 2018 in reformed version (prior to reform, since 1997) | Since 1993 |

Deutsche Bundesbank

activity between banks (interbank trading) has also decreased considerably in past years. These developments are making it increasingly difficult to calculate representative money market reference rates.²²

Availability of representative overnight rates also in central banks' interest

Due to the intensive use of benchmark rates in the private sector and their significance within the financial system, it is also in the public sector's interest for these to be representative and reliable. Furthermore, money market reference rates play a key role for monetary policy, too. For many central banks, short-term interest rates are an operational target when implementing monetary policy. They are often the first step in the monetary policy transmission mechanism, with the central bank steering short-term money market rates at the level of the policy rate.²³ As long as a reference rate representatively reflects the rates at which banks lend or borrow liquidity in the short term, it can help trace the concrete impact of a change in the policy rate. In addition, having a money market reference rate that is used as a reference in longer-term financial market contracts supports the transmission of the monetary policy stimulus beyond the money market.

ECB thus provides the €STR and supports reform process

The difficulties experienced by private sector providers in continuing to supply representative benchmark rates, public interest, and the sig-

nificance of money market reference rates for financial stability and monetary policy have prompted central banks to actively assist the global reform process. There are two main ways in which the Eurosystem is supporting this change. First, the Governing Council of the ECB decided in September 2017 to introduce the unsecured overnight interest rate €STR. Originally, the €STR was to serve as a complement to and backstop for existing benchmark rates provided by the private sector, such as EONIA.²⁴ However, the task of providing reference rates beyond the overnight tenor should not be taken on by the Eurosystem.²⁵ Second, in Sep-

²² See BIS (2019).

²³ See Bindseil (2014).

²⁴ See ECB (2017a). The Governing Council's justification for this decision was twofold. First, interest rate benchmarks are important for the functioning of financial markets and the transmission of monetary policy. Second, it was uncertain at that time as to whether EONIA would in future be recognised as compliant with the requirements of the BMR (see Guideline (EU) 2019/1265 of the European Central Bank of 10 July 2019 on the euro short-term rate (€STR) (ECB/2019/19)). The Governing Council of the ECB decided against providing a reference rate on the basis of secured transactions as, in the secured market, both liquidity and securities can influence the interest rate. This makes the assessment of conditions more difficult, particularly if the spectrum of securities concerned is heterogeneous. Furthermore, a number of euro repo reference rates are already available from private sector providers.

²⁵ The data available do not contain sufficient transactions to construct purely transaction-based longer-term reference rates. Due to a possible (or perceived) conflict of interest with monetary policy, central banks should not provide the expert judgement thus necessitated (see ECB (2020)).

tember 2017, the ECB, together with Belgium’s Financial Services and Markets Authority (FSMA), the European Securities and Markets Authority (ESMA) and the European Commission, launched the private sector working group on euro risk-free rates (hereinafter referred to as the euro area working group).²⁶ The working group is composed of members from the private sector, while the public sector institutions have observer status. The ECB provides the secretariat. Part of the working group’s mandate is to identify and recommend alternative euro risk-free rates and transition paths.²⁷

Private sector working group recommended the €STR as euro risk-free rate

In September 2018, the euro area working group recommended the €STR as the euro risk-free rate, having taken into account feedback from market participants.²⁸ In addition to the €STR, two secured overnight rates from private sector providers were also shortlisted. Market participants backed the €STR, for one, because it is published by the ECB and is based on data which are readily available to the ECB. But there was also a clear desire to continue to have an unsecured benchmark as they saw this to be easier for clients to understand and thus simpler to communicate.²⁹ The recommendation of the €STR as the RFR means that it will fully replace EONIA by the end of 2021. The €STR is also to serve as the basis for fallbacks for products and contracts that reference EURIBOR.³⁰

Other central banks also provide overnight rates that have been recommended as risk-free rates

In other currency areas, too, some central banks are taking on similar tasks to the Eurosystem. They often provide support for private sector working groups in their work on RFRs, for instance by taking on organisational functions. Furthermore, a number of major central banks have also been providing overnight rates; some only since quite recently.³¹ These rates differ in terms of their design – most notably, some refer to the secured money market, while others are based on the unsecured segment. The Federal Reserve Bank of New York, for instance, has been publishing the secured overnight rate SOFR (Secured Overnight Financing Rate) since April 2018. The Bank of England has

been providing an unsecured overnight rate – the reformed SONIA (Sterling Overnight Index Average) – also since April 2018.³² The Bank of Japan has been producing the unsecured overnight rate TONA (Tokyo Overnight Average rate) since as early as 1993.³³ SOFR, SONIA and TONA have each been identified as RFRs by the corresponding working group responsible. In other currency areas, such rates are still provided by the private sector. The recommended RFR in Switzerland, for instance, the secured overnight rate SARON (Swiss Average Rate Overnight) is published by SIX Swiss Exchange.³⁴

■ The €STR

The ECB published the €STR for the first time on 2 October 2019.³⁵ Prior to official daily publication of the €STR, pre-€STR data were released at regular intervals for the period dating back to March 2017.³⁶ To compute the €STR, the ECB uses transaction data for the unsecured money market collected by the Eurosystem within the scope of its money market statistical

€STR based on the Eurosystem’s money market statistical reporting

²⁶ See ECB (2017b).

²⁷ See ECB (2017c).

²⁸ See ECB (2018a).

²⁹ See ECB (2018b).

³⁰ The euro area working group also made recommendations for fallbacks for the €STR (see Working group on euro risk-free rates (2019a)). While the ECB, as a central bank, is exempt from the BMR provisions for benchmark administrators, the use of the €STR falls under the scope of the BMR (see ECB (2019d)).

³¹ Some central banks have extensive statistics on money market transactions that can be used as a data basis.

³² SONIA has been calculated since 1997 and was reformed by the Bank of England, which, in 2016, took over as administrator of the rate (see Bank of England (2018)).

³³ In Australia, the Reserve Bank of Australia publishes the unsecured overnight rate AONIA (AUD Overnight Index Average). In Canada, the Bank of Canada will take over as administrator of the secured overnight rate CORRA (Canadian Overnight Repo Rate Average) as of June 2020.

³⁴ See BIS (2019).

³⁵ The €STR is always published on the next trading day. The first €STR published on 2 October 2019 thus reflected trading activity on 1 October 2019.

³⁶ The ECB published pre-€STR data in order to supply market participants with information on the future €STR from an early stage. The idea was to reduce uncertainty and facilitate a smooth transition. The €STR and pre-€STR are calculated in the same way, although the pre-€STR took into account subsequent data revisions. This was possible because pre-€STR data were published with a time lag.

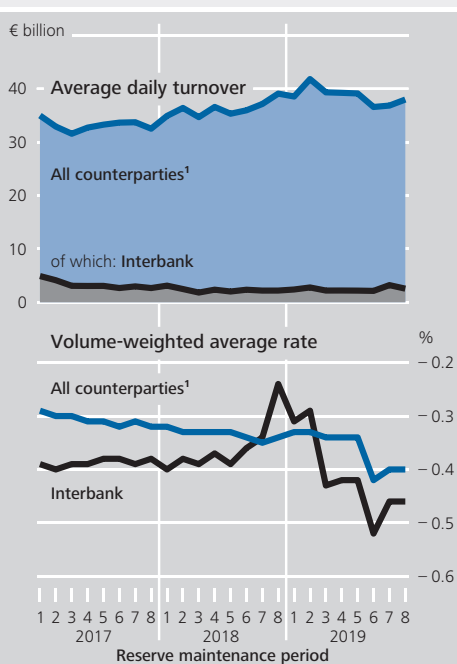
The Eurosystem's money market statistical reporting as the basis for calculating the €STR

The Eurosystem introduced money market statistical reporting (MMSR) in July 2016.¹ The MMSR requires monetary financial institutions (MFIs) domiciled in the euro area and selected on the basis of objective criteria to submit daily transaction-by-transaction reports detailing their activities on the euro money market. The reports for a given trading day are available to the Eurosystem not later than 07:00 on the following trading day. They comprise data on certain euro-denominated money market transactions carried out by the reporting institutions in the unsecured, secured, foreign exchange swap and overnight index swap market segments. This provides the Eurosystem with granular and timely data on developments in the money markets.²

The reporting population consists of the euro area's 50 largest MFIs (hereinafter referred to as the Eurosystem sample).³ The Bundesbank is responsible for recording the data submitted by 13 institutions domiciled in Germany. These data are used in the calculation of the €STR. In addition, owing to the unique features of the German banking system, the Bundesbank collects data from a further 99 banks in Germany in order to ensure that the sample is representative.⁴ This means that the Bundesbank has access to data on the money market activities of 112 banks (hereinafter referred to as the Bundesbank sample), providing an overview of the euro money market in Germany.

The Bundesbank regularly publishes aggregate data from the Bundesbank sample on the unsecured money market.⁵ There has been a slight increase in unsecured overnight borrowing since 2017. At last count, i.e. in the eighth reserve maintenance period of 2019 (18 December 2019 to 28 January 2020), transactions averaging around €38 billion per day were settled. Of those, only around €2.5 billion worth constituted interbank activity, whilst in the first minimum reserve period of 2017 (25 January 2017 to 14 March 2017) the equivalent

Unsecured overnight borrowing by German banks



¹ Sectors reported in the MMSR statistics.
 Deutsche Bundesbank

¹ The legal basis for the collection of data is provided by Regulation (EU) 1333/2014 of the European Central Bank of 26 November 2014 concerning statistics on the money markets (ECB/2014/48), as amended by Regulation (EU) 2015/1599, Regulation (EU) 2019/113 and Regulation (EU) 2019/1677.

² For more details, see Deutsche Bundesbank (2017).

³ An MFI is required to report data on money market transactions if, on 31 December 2014, its total main balance sheet assets exceeded 0.35% of the total main balance sheet assets of all euro area MFIs. A list of reporting institutions is published on the ECB's website.

⁴ See Deutsche Bundesbank (2017).

⁵ Data on the secured segment and on the Eurosystem sample are also available on the Bundesbank's website.

figure had still been close to €5 billion. As such, the share of the market accounted for by interbank transactions is now only just under 7%. Transactions with other financial and non-financial counterparties are of much greater significance.

The minor part played by interbank transactions when it comes to unsecured borrowing by German credit institutions also explains the diverging path taken by the average interest rates in the interbank market and the market as a whole. While the interbank rates do feed into the overall rate, the low volumes involved mean that their influence there is only slight. The average interbank rate exhibits a greater degree of volatility as, after all, larger single transactions can indeed have a perceptible impact on the aggregate rate. Furthermore, the overall interest rate is generally higher than both the interbank rate and the interest rate on the deposit facility. This is due, in particular, to transactions with non-financial corporations, where a negative interest rate is rarely applied.

On the basis of the data published by the Bundesbank, it is not possible to draw any conclusions as to the contribution to the €STR made by banks domiciled in Germany. This is because of definition-related differences arising not only as a result of the different samples being drawn upon. For example, the €STR only captures deposits by financial counterparties. The MMSR data also contain transactions with non-financial counterparties, that is to say with non-financial corporations classified as wholesale customers and with general government. Moreover, alongside deposits, the MMSR also covers call money/call accounts plus trading of short-term securities on the primary market. In particular, open-basis transactions (referred to in Germany as *„Bis-auf-Weiteres“* transactions), which are re-

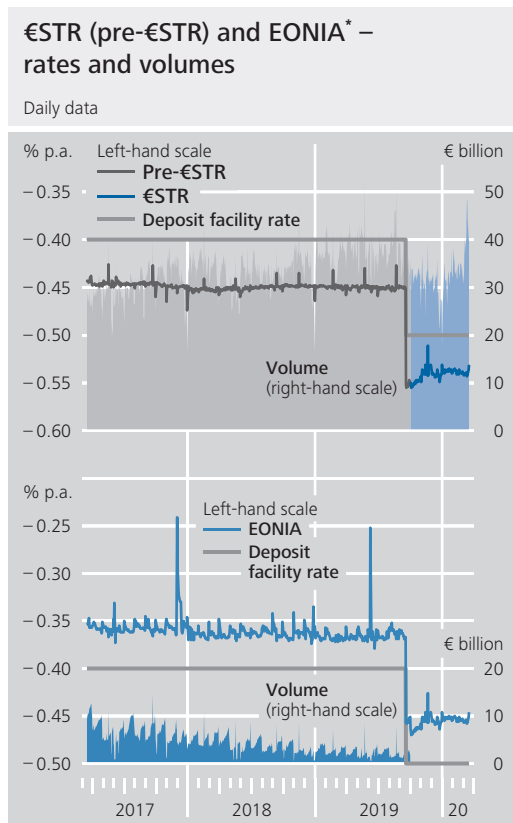
ported as call accounts and play a rather significant role in Germany, do not feed into the calculation of the €STR as they are used only in a very small number of euro area countries and there is no harmonised legal framework in place for that particular financial product.⁶ Furthermore, trimming is applied for the €STR, meaning that particularly high and particularly low rates are excluded from the calculation.

⁶ See ECB (2020).

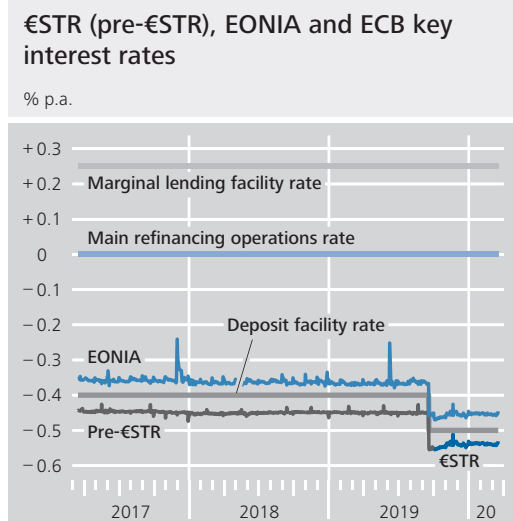
reporting (MMSR). Even if the IOSCO Principles and the BMR do not apply to central banks in their capacity as benchmark administrators, the ECB has transposed the standards set out therein for the production of the €STR, where relevant and appropriate.³⁷

There are a number of differences between the €STR and EONIA. The €STR covers a larger set of banks. While EONIA reflects lending activity, the €STR is based on borrowing transactions, covering various financial counterparties' deposits with reporting banks. These counterparties may include banks, money market funds, investment and pension funds, insurance corporations and other financial agents such as central banks. As such, the sectoral coverage of the €STR is significantly broader than for EONIA, which captured transactions between banks only. This is because of the fact that the interbank market now accounts for a far smaller share of the money market, while other financial counterparties have gained in significance.³⁸ The wider set of counterparties is to shield against manipulation and ensure that the €STR provides a reliable reflection of the interest rate applying to unsecured overnight borrowing in the euro area.³⁹ Since the €STR was first published in October 2019, daily reported €STR volumes have averaged over €30 billion, compared with an EONIA volume of around €2 billion at last count.

The €STR represents unsecured overnight borrowing by banks domiciled in the euro area from financial counterparties in the money market



Source: ECB. * As of 1 October 2019, EONIA is calculated as €STR plus 8.5 basis points.
 Deutsche Bundesbank



Source: ECB.
 Deutsche Bundesbank

Owing to the difference between lending and borrowing and the fact that transactions with non-banks are also included in the calculation, the €STR fixes at lower levels than EONIA. Looking at the pre-€STR data, there was a relatively constant spread between the pre-€STR and EONIA. For the interbank rate EONIA, the Eurosystem's interest rate on the deposit facility (hereinafter referred to as the deposit facility rate) functions as a floor. Since the panel banks have the option of placing their liquidity in the deposit facility, they are not willing to deposit it in the market at a lower interest rate. The €STR, meanwhile, also takes account of transactions with counterparties which do not have access

Monetary policy steering not impaired by the €STR fixing below the rate on the deposit facility

³⁷ See Guideline (EU) 2019/1265 of the European Central Bank of 10 July 2019 on the euro short-term rate (€STR) (ECB/2019/19), recital 7.
³⁸ See ECB (2017d).
³⁹ See ECB (2019a).

€STR calculation method and procedure triggered in the event of temporarily insufficient data availability (contingency procedure)*

The €STR is calculated for each TARGET2 business day as a volume-weighted, trimmed mean on the basis of transactions conducted and settled on a given TARGET2 business day. Only transactions with a value of at least €1 million are included. The ECB publishes the €STR, rounded to three decimal places, at 08:00 CET on the next TARGET2 business day. If errors that affect the rate by more than 2 basis points are detected following standard publication, the €STR is revised and re-published on the same day by no later than 09:00 CET.

The volume-weighted, trimmed mean is calculated by:

1. ordering transactions from the lowest rate to the highest rate;
2. aggregating the transactions occurring at each rate level;
3. removing the top and bottom 25% in volume terms (trimming); and
4. calculating the mean of the remaining 50% of the volume-weighted distribution of rates.

If data availability is temporarily insufficient, a contingency procedure for calculating the €STR is triggered. This happens where:

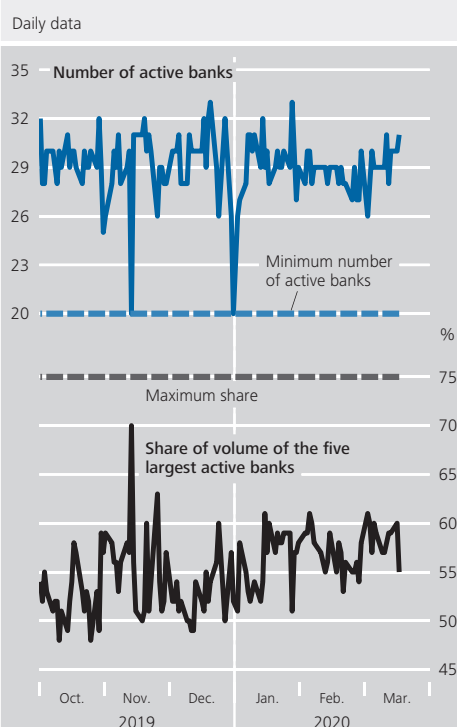
1. the number of reporting banks is less than 20; or
2. five banks account for 75% or more of total transaction volumes.

These two criteria are intended to address, amongst other things, cases where there is an overall lack of data or where systems

break down, preventing a sufficient data feed, thereby impairing the calculation of a representative transactions-based rate.

If the contingency procedure is triggered, the €STR is calculated based on transactions from both the previous TARGET2 business day and the day before that. If that is not sufficient, transactions from successively earlier days will be incorporated into the €STR calculation until the two criteria are no longer met. It has not yet been necessary to apply the contingency procedure.

€STR contingency metrics



Source: ECB.
 Deutsche Bundesbank

* See Deutsche Bundesbank (2019b).

to the Eurosystem deposit facility.⁴⁰ Particularly in the current environment of excess liquidity, these counterparties are ready to part with liquidity at rates below the deposit facility rate.⁴¹ Although the deposit facility rate does not function as a lower bound for the €STR, the two rates are closely linked. Indeed, the pass-through of the ECB's deposit facility rate cut effective as from 18 September 2019 was full and immediate, as shown by the pre-€STR data. Monetary policy steering of the €STR is therefore not impaired.

Transition from EONIA to the €STR

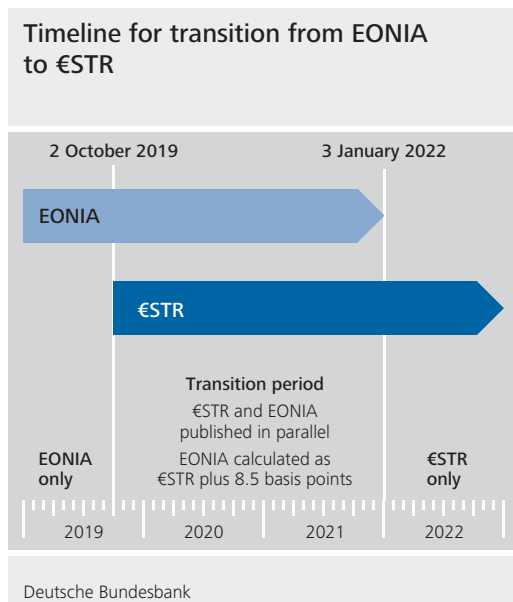
EONIA is to be fully replaced by the €STR ...

As the administrator of EONIA, EMMI launched a reform process in 2016 with the objective of complying with the BMR requirements. Due to its transaction-based calculation methodology, EONIA was long regarded as a suitable RFR.⁴² However, EMMI came to the conclusion that without modifying the definition and calculation methodology, it was not possible to adjust EONIA so as to comply with the requirements contained in the BMR. This prompted EMMI to halt its work on reforming EONIA in February 2018.⁴³ As a consequence, use of EONIA in new contracts would have been precluded once the BMR transitional period came to an

end. In selecting the €STR as the euro risk-free rate, the euro area working group therefore also recommended that EONIA be replaced by the €STR.⁴⁴

The euro area working group mapped out a transition path from EONIA to the €STR, and this is being implemented by EMMI in accordance with the working group's recommendations.⁴⁵ For a limited period of transition, EONIA is being calculated on the basis of the €STR. EMMI changed its methodology for calculating EONIA once €STR publication began on 2 October 2019. Since then, EONIA has been calculated as the €STR plus a fixed spread of 8.5 basis points. This spread captures the historical difference between EONIA (interbank/lending) and the pre-€STR (interbank and other financial counterparties/borrowing) across a 12-month period and was determined by the ECB using a methodology recommended by the euro area working group.⁴⁶ Since the change in the calculation methodology meant shifting publication of EONIA to the following business day, market participants needed to make corresponding technical adjustments. The change-over went smoothly.⁴⁷ With this new set-up in place, in December 2019 the FSMA as the competent supervisory authority authorised EMMI as the administrator of EONIA, in application of the BMR.⁴⁸ The requirements laid down in the BMR are thus considered met and EONIA qualifies as BMR-compliant.

... and is already being calculated on the basis of the €STR



The transition period, during which the €STR and EONIA are being published in parallel, ends on 3 January 2022. In line with the euro area

Transition must be completed by the end of 2021

⁴⁰ The borrowing transactions of banks which feed into the €STR calculation constitute lending transactions for the corresponding counterparties. A crucial factor in how the deposit facility rate influences the interest rate applying to these transactions is therefore whether the counterparty is able to access the deposit facility.
⁴¹ See Cœuré (2019).
⁴² See FSB (2014) and FSB (2017).
⁴³ See EMMI (2018).
⁴⁴ See ECB (2018a).
⁴⁵ See ECB (2019e) and EMMI (2019a).
⁴⁶ See ECB (2019f).
⁴⁷ See ECB (2019g).
⁴⁸ See FSMA (2019a).

working group's recommendation, EMMI will discontinue publication of EONIA on that date.⁴⁹ By then, the transition from EONIA to the €STR must therefore be complete. This is the first time worldwide that such a pathway has been used for the transition from an existing interest rate benchmark to its successor.

Transition affects numerous products and business areas ...

The ongoing transition from EONIA to the €STR calls for extensive preparatory work and adjustments since EONIA is used in a multitude of financial instruments. For instance, the market for euro-denominated overnight index swaps (OISs) references EONIA as the floating rate. But EONIA also plays a significant role for the wider derivatives market beyond OISs. For example, EONIA is used as the cash collateral remuneration rate for collateralised derivatives, and the EONIA OIS curve is used for discounting future cash flows in the valuation of derivatives, including those referencing EURIBOR. Outside the derivatives market, EONIA serves, among other things, as a floating rate for short-term securities (e.g. commercial paper, certificates of deposit) or repos. It can also have a bearing on retail customers in cases where it is used to determine interest on giro and savings accounts or overdraft facilities. In addition, EONIA is also of relevance for domains such as risk management and financial accounting.⁵⁰ The euro area working group published comprehensive recommendations for these areas, in order to facilitate the transition to the €STR.⁵¹ Market participants have been asked to actively transition from EONIA to the €STR in a timely manner, when feasible, by replacing products referencing EONIA with €STR-based products and scaling back EONIA legacy business as soon as possible. Market makers are instructed to proactively price using the €STR, rather than EONIA, as their default. The euro area working group's expectation is that market liquidity for €STR-based products will reach at least the level of the current EONIA markets.⁵²

... and requires amendment of contracts

Market participants need to amend any contracts referencing EONIA maturing after 31 December 2021.⁵³ There are no legislative provi-

sions envisaged. Wherever possible, EONIA should be replaced by the €STR. Market participants can agree on compensation mechanisms designed to avoid undesired value transfers arising in connection with the replacement of EONIA by the €STR. Alternatively, robust fallback provisions that will come into effect when publication of EONIA is discontinued can be introduced.⁵⁴ In this context, the euro area working group recommends incorporating the €STR plus a spread of 8.5 basis points as a fallback.⁵⁵ Preferably, new contracts should no longer reference EONIA.⁵⁶ In Germany, the requisite contractual amendments need to be made to the German master agreements for financial transactions (*Deutsche Rahmenverträge für Finanzgeschäfte*) and their addenda, too.⁵⁷ The documentation is drawn up by a cross-association working group of the Association of German Banks (*Bundesverband deutscher Banken*) in consultation with the German Banking Industry Committee (*Deutsche Kredit-*

⁴⁹ See EMMI (2019a).

⁵⁰ See Working group on euro risk-free rates (2018a).

⁵¹ See Working group on euro risk-free rates (2019b, 2019c, 2019d, 2020a). In March 2020, the euro area working group also published a public consultation addressing specific issues relating to swaptions (see Working group on euro risk-free rates (2020b)).

⁵² In this context, liquid €STR derivatives markets are considered a precondition for the transition of the other products to allow hedging of €STR-based products (see Working group on euro risk-free rates (2020a)).

⁵³ See Working group on euro risk-free rates (2019e).

⁵⁴ In respect of derivatives falling within the scope of the European Market Infrastructure Regulation (EMIR), the Chair of the euro area working group sent a letter in July 2019 asking ESMA and the European Commission to issue an assurance that the incorporation of fallback provisions or the replacement of EONIA with the €STR, including when taking into account a spread or any other type of compensation mechanism, would not have the effect of imposing margin or clearing obligations under EMIR (see Van Rijswijk (2019)). Work is currently underway looking into corresponding legal provisions (see Dombrovskis (2019a) and ECB (2019d)).

⁵⁵ This aligns the recommended fallback with the methodology for calculating EONIA during the transition period and means there would be no value transfer in the event of the fallback being triggered.

⁵⁶ See Working group on euro risk-free rates (2019e).

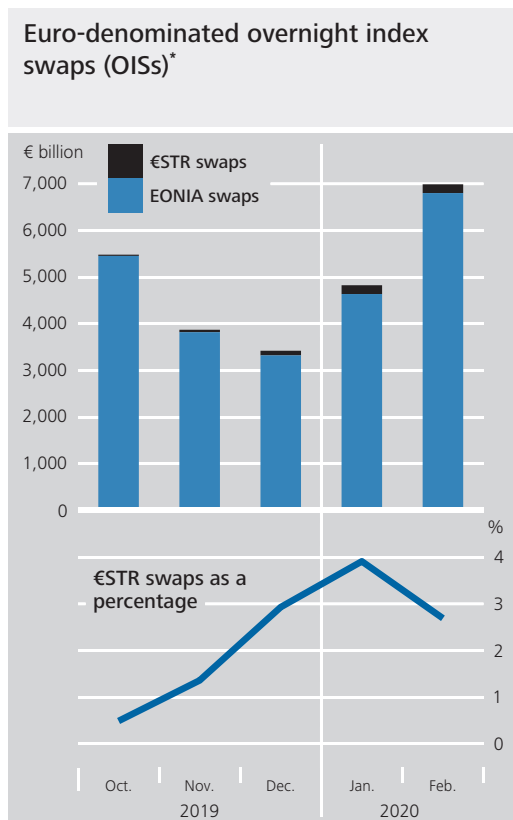
⁵⁷ The relevant agreements in this context are the master agreement for financial derivatives transactions (*Deutscher Rahmenvertrag für Finanztermingeschäfte*), the master agreement for securities lending (*Deutscher Rahmenvertrag für Wertpapierdarlehen*) and the master agreement for repurchase transactions (repos) (*Deutscher Rahmenvertrag für Wertpapierpensionsgeschäfte* (Repos)).

wirtschaft). This group is currently drafting a supplementary agreement which contracting parties can use to migrate the references used in the master agreements and addenda, existing collateral agreements and individual contracts from EONIA to the €STR. The supplementary agreement will also enable market participants to incorporate fallback provisions.

Development of €STR derivatives market already underway, ...

The discontinuation of EONIA in January 2022 means that OIS trading needs to be fully transitioned to the €STR. This also impacts German market participants. In the 12 months leading up to the introduction of the €STR (i.e. from 1 October 2018 to 30 September 2019), German banks required to report to the Bundesbank under the MMSR recorded around 9,300 OIS transactions with a notional amount totaling just under €5 trillion.⁵⁸ 30 reporting institutions engaged in transactions with around 100 counterparties (approximately 80 of which fell outside the group subject to reporting requirements), with the majority of the volume being

traded via central counterparties (CCPs). Trades with maturities extending beyond the end of 2021, some of which run until 2069, make up just under half of all transactions and account for less than 10% of the total turnover. Since the €STR was introduced, participants in the euro money market have already been trading the first €STR swaps.⁵⁹ The CCPs LCH and Eurex Clearing began offering clearing of €STR swaps in October 2019 and November 2019, respectively.⁶⁰ The monthly volume of €STR swaps recorded through LCH SwapClear has so far risen from just short of €27 billion in October 2019 to around €181 billion in February 2020 (total outstanding volume at the end of February: €279 billion, the majority of which maturing in under one year). Eurex Clearing's monthly volume for February 2020 stood at just under €7 billion (with amounts in previous months ranging between €10 billion and €16 billion). However, at around 3% at last count, €STR swaps still only account for a very small share of the OISs being cleared via CCPs on a monthly basis compared with EONIA swaps. Both CCPs have furthermore announced that they will be switching their cash collateral remuneration rate (price alignment interest, or PAI) and discounting from EONIA to the €STR on or around 22 June 2020.⁶¹ In doing so, they are following the recommendation of the euro area working group to perform the switch preferably towards the end of the second quarter of 2020. Market participants are encouraged to then take a phased approach to transitioning the cash collateral remuneration rate as defined within their bilateral credit support annexes (CSAs).⁶² In Germany, this includes the collateral addenda to the German master agreement for financial derivatives transactions. Contract-



Sources: LCH Group and Eurex Clearing. * Trading volumes cleared via central counterparties (CCPs).
 Deutsche Bundesbank

⁵⁸ This includes all reported transactions, i.e. payment and receipt of the fixed and floating legs.

⁵⁹ In principle, €STR futures can also be traded (see ICE (2020)).

⁶⁰ See LCH (2019a) and Eurex Clearing (2019a).

⁶¹ See LCH (2019b) and Eurex Clearing (2019b). The CCP CME Group has also scheduled its switch for the same date (see CME Group (2020)). Other CCPs are also aiming to align with the same date where possible (see ECB (2019h)).

⁶² See Working group on euro risk-free rates (2019b, 2020a).

Looking back: the replacement of FIBOR by EONIA and EURIBOR when introducing the euro in 1999

Until the beginning of monetary union, FIBOR (Frankfurt Interbank Offered Rate) was a key benchmark rate for DM interest rates with overnight tenor and tenors from one to twelve months, especially for banks in Germany. It was introduced in August 1985 with the Bundesbank's support as an alternative benchmark to DM-LIBOR. Issuing floating rate bonds had been permitted in Germany since April 1985, and these bonds were to reference an interest rate set in Germany. FIBOR was published by a private sector provider, Privatdiskont AG.

The introduction of the euro in 1999 brought with it the transition to new, European benchmarks – EURIBOR and EONIA. The calculation of FIBOR was discontinued. In Germany, the transition from FIBOR to the new rates was implemented by means of a statutory order – the FIBOR Transition Regulation (*FIBOR-Überleitungs-Verordnung*, or FIBOR-VO) of 10 July 1998.¹ This order replaced FIBOR with EURIBOR in the acquisition of one-month to twelve-month funds, while for overnight funds FIBOR was superseded by EONIA.²

A statutory regulation was considered expedient in order to ensure a seamless migration of existing legislation and contracts and thereby provide legal certainty. According to the Federal Ministry of Finance, the fact that the new rates matched the old benchmark rates “in their nature and manner of collection”, i.e. they assumed precisely the role of FIBOR in terms of their characteristics, was an argument in favour of the legislative solution.³

A key component of the transition was the explicit regulatory provision governing the continuity of contracts under civil law.⁴ This prevented contracting parties from asserting contractual frustration as a result of the relevant benchmark's replacement and

allowed existing contracts to remain in force unchanged using the new interest rates. At the same time, the principle of freedom of contract remained unaffected by FIBOR's replacement, which meant that the contracting parties were also able to agree on a different benchmark rate from EURIBOR or EONIA.

The statutory order to replace FIBOR thus formed part of the body of legislation on the introduction of the euro in Germany. The replacement of national currencies by the single currency of the euro can therefore be seen as a particular exception that prompted the regulation by statutory order of the transition between different benchmark rates provided and used by the private sector that accompanied the introduction of the euro. No statutory regulation is planned for the transition from EONIA to the €STR.⁵

¹ These were decreed by the Federal Government in performance of Section 3(2) No 2 of the Discount Rate Transition Act (*Diskontsatz-Überleitungs-Gesetz*, or DÜG). The DÜG is a component of the Act on the Introduction of the Euro (*Euro-Einführungsgesetz*, or EuroEG) of 9 June 1998. In France, too, legislation was issued on the transition of the local benchmarks PIBOR (Paris Interbank Offered Rate) and TMP (“*taux moyen pondéré*”). The corresponding French statutory order was very similar to the one issued in Germany (see Folter (1998)).

² In July 1990, FIBOR was adjusted to international conventions (additional tenors, actual/360 day-count method of calculation, two-day settlement and expanding the panel from 12 to 19 banks). FIBOR reference rates which drew on a basis that applied prior to the adjustment were also superseded by EURIBOR, although this had to be multiplied by a correction factor in order to offset the effect of the different day count convention.

³ See Federal Ministry of Finance (1998).

⁴ See Section 4 sentence 1 of the DÜG.

⁵ In the United States, the ARRC recently published a proposal for legislation on the introduction of SOFR-based fallback provisions in contracts that reference USD LIBOR and are governed by New York State law (see ARRC (2020a)).

ing parties will be able to make use of the supplementary agreement mentioned above for this. It is generally expected that the €STR swap market will develop further especially once the CCPs have switched to the €STR in June 2020.

... whilst other products are to be transitioned in a timely manner, too

Outside the derivatives market, the majority of contracts and financial instruments referenced to EONIA have short maturities ending before the end of 2021.⁶³ Where these cash products are concerned, cancellation or amendment of legacy contracts is therefore less relevant. The euro area working group recommends transitioning to the €STR as soon as possible. Short-term securities should no longer be issued on the basis of EONIA, for example.⁶⁴ The first €STR short-term securities have already been issued. In line with the recommendation of the International Capital Market Association (ICMA), repos traded in the interbank market should be based on a fixed rate rather than a floating rate.⁶⁵ Generally, only a small proportion of repos are transacted on a floating rate basis. This share has fallen further since the introduction of the €STR.⁶⁶

The €STR as a basis for EURIBOR fallbacks

EURIBOR can continue to be used as reform has been completed, ...

In response to the discussion surrounding new standards for the production of benchmark rates, EMMI – in its capacity as the administrator of EURIBOR – started the process of reforming the expert-judgement-based EURIBOR early on. In particular, the calculation methodology was to be changed to one that is underpinned to the greatest extent possible with transaction data.⁶⁷ In the end, EMMI developed a hybrid methodology that first takes transaction data into account, but draws on expert judgement in the absence of sufficient transactions.⁶⁸ The reformed EURIBOR reflects borrowing activity in the unsecured money market (i.e. not only the interbank market but now also transactions with financial counterparties outside the banking sector and with general government), while the calculation continues to be based on the

voluntary contributions from a panel of banks. EMMI completed the phase-in of EURIBOR's new methodology in November 2019.⁶⁹ Against this background, EMMI had already received authorisation from the FSMA as the administrator of EURIBOR in July 2019, in application of the BMR.⁷⁰ EURIBOR is thus considered BMR-compliant and can be used until further notice.⁷¹ In contrast, users of LIBOR need to prepare for the discontinuation of rates after the end of 2021.

EURIBOR's long-term viability will depend on the administrator and the willingness of the panel banks to continue contributing to the calculation as well as on the liquidity of the underlying market going forward. Even if EURIBOR can continue to be used, it will therefore be necessary to improve the robustness of contracts referencing EURIBOR by incorporating suitable fallback provisions.⁷² This includes determining objective triggers that would activate the fallback. In this respect, the BMR considers material changes to or cessation of a benchmark as triggers. In the past, contracts were frequently concluded without fallback provisions or only included provisions intended to address the temporary unavailability of the benchmark rate. In order to fulfil the IOSCO Principles and the requirements of the BMR, contracts need to also contain provisions for the event that the benchmark used ceases to be provided, however. This acts to mitigate legal and operational risk.⁷³ To this end, the euro area working group has been looking at potential fallbacks based on the €STR. It needs to be noted here that these two rates differ in terms of their tenor (overnight for the €STR

... although contracts referencing EURIBOR need to be made robust

⁶³ See Working group on euro risk-free rates (2019e).

⁶⁴ See Working group on euro risk-free rates (2019b).

⁶⁵ See ICMA (2019) and Working group on euro risk-free rates (2019b).

⁶⁶ See Working group on euro risk-free rates (2020a).

⁶⁷ See EMMI (2015).

⁶⁸ Expert judgement continues to have a very strong influence, however (see EMMI (2019b)).

⁶⁹ See EMMI (2019c).

⁷⁰ See FSMA (2019b).

⁷¹ See Maijoor (2019) and Dombrovskis (2019b).

⁷² See ECB (2019h).

⁷³ See Working group on euro risk-free rates (2019f).

and one week to twelve months for EURIBOR) and their risk profile (the €STR without risk premia). This means that corresponding adjustments are necessary. To adjust the tenor, it is possible to calculate risk-free term rates based on the €STR. A distinction is made here between backward-looking and forward-looking calculation methods.⁷⁴ The difference compared to EURIBOR due to the risk premia included in EURIBOR is to be offset by adding a spread (“adjustment spread”).⁷⁵

Backward-looking term rates are determined by averaging the realised €STR fixings across a time horizon matching the respective tenor, whilst at times also taking into account compounding effects.⁷⁶ Unlike in the case of EURIBOR, this does not map any expectations regarding future interest rate movements, whereas changes in interest rates that occur during the time horizon are captured in the calculation. In general, the applicable interest rate – and consequently the amount of interest to be paid – is only known at the end of the calculation period. Should this be undesirable for market participants seeking greater budget planning, cashflow and risk management certainty, for example, there are a number of different calculation options available to them, although in these cases the observation period (i.e. the €STR fixings included in the calculation) and the interest period (i.e. the period to which the calculated interest rate applies) are not congruent or not fully congruent. This means that interest rate changes that took place in the interest period are not necessarily taken into account.⁷⁷ Because the €STR is publicly available, and historical data are also available for a certain time period in the shape of the pre-€STR, market participants are already able to calculate backward-looking €STR term rates.⁷⁸ Common market conventions for calculating these term rates or their publication will make their uniform application possible.

Forward-looking term rates factor in expectations regarding interest rate movements and are already available at the start of the interest

period.⁷⁹ For the €STR, these rates could be derived from the €STR derivatives markets. The euro area working group looked into different methods for calculating these and recommended a methodology based on tradable €STR OIS quotes, provided that certain requirements are met, such as sufficient market liquidity, transparent and regulated trading and data sufficiency.⁸⁰ Multiple potential administrators have expressed interest in producing €STR-based forward-looking term rates.⁸¹ A robust, €STR-based forward-looking term structure can only be expected to be available, however, once the €STR derivatives markets are sufficiently liquid.

The cross-currency work performed by ISDA on fallbacks for derivatives referencing interbank offered rates (IBORs) includes fallback provisions for EURIBOR as well. A corresponding market consultation, which also covers EUR LIBOR, was published in December 2019.⁸² In this market consultation, ISDA proposed to use backward-looking compounded term rates (“compounded setting in arrears rate approach with a backward-shift adjustment”) with an adjustment spread based on historical data (“historical median over a five-year lookback period”). This approach was affirmed by the vast majority of respondents.⁸³ The methodology used here is consistent with the approach preferred by market participants in earlier consultations on IBORs of other currencies (espe-

... whereas the availability of forward-looking term rates based on €STR derivatives remains open

ISDA envisages backward-looking fallbacks for derivatives, ...

Backward-looking fallbacks based on the €STR can be calculated already, ...

⁷⁴ See Working group on euro risk-free rates (2018b) and BIS (2019).

⁷⁵ See Working group on euro risk-free rates (2019g, 2019h).

⁷⁶ See Working group on euro risk-free rates (2018b).

⁷⁷ See FSB (2019a) and Working group on euro risk-free rates (2019g).

⁷⁸ The euro area working group has not yet made any specific recommendations on the use of these rates. The work of ISDA on €STR-based backward-looking fallback provisions in derivatives contracts has not been completed yet either.

⁷⁹ EURIBOR can also be classified as a forward-looking term rate.

⁸⁰ See ECB (2019e) and Working group on euro risk-free rates (2018b).

⁸¹ See ECB (2019d).

⁸² See ISDA (2019a).

⁸³ See ISDA (2020a).

cially LIBOR) and would therefore create consistency across currencies. According to the recommendations of the FSB OSSG, forward-looking fallback rates were not considered.⁸⁴ The fallbacks are to be activated in the event of cessation of EURIBOR, in line with the approach for the respective benchmark rates in other currency areas. They might potentially also be activated even before permanent discontinuation (“pre-cessation trigger”, especially if the rate were to be declared non-representative).⁸⁵ Implementation of the fallbacks and their triggers is scheduled for 2020 by means of an amendment to the definitions referred to in the ISDA master agreement, which apply to new contracts.⁸⁶ Moreover, ISDA is planning to publish a protocol which market participants can use to supplement legacy contracts. The fallback provisions will be included in legacy contracts if both contracting parties adhere to the protocol (or otherwise agree bilaterally to amend their contracts accordingly).⁸⁷

... while the potential role for €STR-based forward-looking term rates still needs to be analysed

The euro area working group’s work on €STR-based fallbacks for EURIBOR has not yet been concluded. In particular, the analysis of the role played by backward-looking approaches compared to forward-looking approaches with respect to the various asset classes for which EURIBOR is used is still pending.⁸⁸ Taking account of international developments and ISDA’s work, this analysis has to weigh up considerations regarding cross-currency consistency and possible idiosyncrasies of the euro area that may necessitate a different approach. Notably, the significant role that EURIBOR plays in the retail markets of certain euro area countries should be borne in mind.

Incorporating fallback provisions has wider effects

The euro area working group has issued initial high-level recommendations for incorporating fallback provisions in contracts referencing EURIBOR.⁸⁹ For instance, market participants can use generic language to incorporate fallbacks, triggers and adjustment spreads as long as the working group has not issued any specific recommendations in this regard. For derivatives transactions executed outside the

scope of ISDA, the working group recommends amending the relevant master agreements (such as the German master agreement for financial derivatives transactions in Germany) in line with ISDA’s work, if possible. The working group also draws attention to the implications of inconsistencies in fallbacks and their triggers across asset classes or currencies for risk management and financial accounting. For example, consistency across asset classes may be necessary to achieve hedge effectiveness (i.e. uniform fallback provisions for hedges and hedged items).⁹⁰ Furthermore, market participants might also need to make technical adjustments, for example to depict backward-looking term rates in their IT systems, including loan-processing systems.

In addition to using €STR-based fallbacks, in principle market participants can also opt for the €STR as a direct alternative to EURIBOR. One factor that might have a bearing on this decision is how developments evolve in other currency areas on account of the progressive transition from LIBOR to RFRs. This would be conceivable, for example, for products involv-

International developments could influence market decisions on the use of the €STR as a direct alternative to EURIBOR

⁸⁴ See FSB (2018).

⁸⁵ See ISDA (2019a, 2020b). ISDA’s work on pre-cessation triggers has focused on LIBOR hitherto.

⁸⁶ The ISDA master agreement is used as standard documentation for over-the-counter (OTC) derivatives. In addition to the ISDA master agreement, CCPs that offer clearing of derivatives also reference the definitions provided by ISDA (see ISDA (2019a)).

⁸⁷ See ISDA (2019b).

⁸⁸ See Working group on euro risk-free rates (2019f).

⁸⁹ See Working group on euro risk-free rates (2019f).

⁹⁰ See Working group on euro risk-free rates (2019c, 2019d, 2019f). The potential implications for margin requirements and clearing obligations under EMIR are another factor to consider (see Van Rijswijk (2019) and Dombrovskis (2019a)). As regards hedge accounting, the International Accounting Standards Board (IASB) has amended certain accounting standards in order to take account of existing uncertainties during the IBOR reform processes (see IASB 2019)). These amendments were also transposed into European legislation (see Commission Regulation (EU) 2020/34 of 15 January 2020 amending Regulation (EC) No 1126/2008). The IASB’s considerations on the potential consequences on financial accounting of replacing an existing benchmark with an alternative are still pending. In Germany, the Institute of Public Auditors in Germany (*Institut der Wirtschaftsprüfer in Deutschland*, or IDW) has published a comment on the implications for financial accounting under commercial law of the reform of certain interest rate benchmarks for financial instruments (IDW RH FAB 1.020).

Upcoming discontinuation of LIBOR and role of RFRs

LIBOR is provided daily for the USD, GBP, CHF, EUR and JPY for several tenors.¹ According to the FSB, LIBOR is the most referenced benchmark in USD, GBP, CHF and JPY. In 2014, the FSB estimated the notional amount of outstanding contracts that reference LIBOR at around US\$220 trillion, with USD LIBOR accounting for the largest share.² In December 2017, the European Commission declared LIBOR a critical benchmark under the BMR.³ In order to meet the requirements contained in the IOSCO Principles and in the BMR, LIBOR was reformed by its administrator, IBA. In April 2019, IBA completed the transition to a reformed methodology, based first on transaction data. If the available transaction data are not sufficient, expert judgement is used. The reformed LIBOR is designed to reflect the refinancing costs of large, internationally active banks in the unsecured money market, i.e. covering both the interbank market as well as transactions with other counterparties, in some cases beyond the financial sector.⁴ IBA had been authorised as administrator pursuant to the BMR by the competent supervisory authority, the UK Financial Conduct Authority (FCA), back in April 2018.⁵

However, after the reform, LIBOR is still chiefly calculated based on expert judgement due to the low level of liquidity in the underlying market, i.e. in the unsecured money market for tenors of up to 12 months. The FCA thus questioned the sustainability of LIBOR. In July 2017, Andrew Bailey, Chief Executive of the FCA, confirmed that the FCA will no longer persuade panel banks to voluntarily contribute to LIBOR beyond the end of 2021, nor will it make this compulsory. Market participants will therefore have to prepare for LIBOR to

be discontinued and ensure that they have transitioned to alternative transactions-based reference rates by the end of 2021.⁶ Furthermore, the FCA indicates that LIBOR, if calculated beyond the end of 2021, might not pass its representativeness test.⁷ As part of its work programme, the FSB will monitor progress made in transitioning from LIBOR in 2020 and report to the G20 on remaining challenges.⁸

The working groups in the United States, the United Kingdom and Switzerland are thus mapping out the transition from LIBOR to the corresponding RFR (SOFR, SONIA and SARON, respectively).⁹ In Japan, the reformed TIBOR (Tokyo Interbank Offered Rate) is expected to continue to be used alongside the RFR TONA.¹⁰ This means, first, that the RFR will be used as the standard reference rate and that new products and contracts will no longer be concluded based on LIBOR. Second, products and contracts

¹ Overnight/spot next, 1 week, 1 month, 2 months, 3 months, 6 months and 12 months.

² See FSB (2014). The Bank for International Settlements (BIS) estimated this figure to be closer to around US\$400 trillion as of mid-2018 (see BIS (2019)). As mentioned above, EUR LIBOR is only of secondary importance, as EURIBOR is in more frequent use.

³ See Commission Implementing Regulation (EU) 2017/2446 of 19 December 2017 amending Implementing Regulation (EU) 2016/1368 establishing a list of critical benchmarks used in financial markets pursuant to Regulation (EU) 2016/1011 of the European Parliament and of the Council.

⁴ See IBA (2020).

⁵ See ICE (2018).

⁶ See Bailey (2017, 2018).

⁷ Under the BMR, a test of this nature is to be conducted when a panel bank leaves the panel (see Bailey (2019)). The FCA also underlined that the provisions from the BMR have been transposed into UK law. The requirements in place to date will therefore also apply after Brexit (see FCA (2020a)).

⁸ See FSB (2019c) and G20 (2020).

⁹ The working groups are the ARRC in the United States, the Working Group on Sterling Risk-Free Reference Rates in the United Kingdom and the NWG in Switzerland.

¹⁰ See FSB (2019b).

(both legacy and new) that still reference LIBOR should either be actively changed to the RFR (or RFR-based term rates) or should contain appropriate fallbacks. The focus is on using backward-looking methods.¹¹ In the United States, the Federal Reserve Bank of New York began publishing backward-looking SOFR term rates in March 2020.¹² In the United Kingdom and Switzerland, too, the administrators of SONIA (Bank of England) and SARON (SIX) are planning on publishing backward-looking term rates.¹³ While the calculation of forward-looking term rates is also being examined, it is likely that – if available in future – their use will remain limited. According to the FSB, for reasons of financial stability, as a rule derivatives should reference RFRs rather than less robust term rates derived from RFR derivatives markets. The use of such rates is set to be limited outside of derivatives markets.¹⁴ The Working Group on Sterling Risk-Free Reference Rates intends SONIA-based forward-looking term rates to be used in cash products only in exceptional cases, for instance for smaller firms or retail customers.¹⁵ SONIA-based forward-looking term rates are expected to be published for the first time in the third quarter of 2020 and SOFR-based rates by the end of 2021.¹⁶ The development of term rates is also being advanced in Japan, with publication expected to begin in mid-2021.¹⁷ By contrast, the assumption in Switzerland is that no robust forward-looking term rates on the basis of SARON derivatives markets will be available.¹⁸

For derivatives, ISDA conducted public consultations on RFR-based backward-looking fallbacks for all LIBOR currencies.¹⁹ At the request of the FSB OSSG, ISDA is continuing to work on incorporating pre-cessation triggers, which would enable a fallback to take effect before the reference rate is discontinued. This would be relevant in particular

if the FCA were to declare LIBOR as not being representative.²⁰

According to the FSB, the development of RFR markets in derivatives and securities is making good progress; however, transition needs to accelerate for loans and securitisations. In the United States, new markets are developing for SOFR futures and swaps, and SOFR bonds (floating rate notes, FRNs).²¹ Transition from USD LIBOR to SOFR is, however, still lagging behind the transition from GBP LIBOR to SONIA.²² In the United Kingdom, SONIA has become the standard for newly issued floating rate bonds and securitisations. According to the FCA, as of March 2020, SONIA should be the standard for quoting swaps and, as of the third quarter of 2020, new loans should only reference SONIA and no longer LIBOR.²³ The Bank of England announced that, as of 2022, it would no longer accept securities or loans referencing LIBOR as collateral for its monetary policy oper-

¹¹ For more information as well as recommendations, see the working groups' websites.

¹² See Federal Reserve Bank of New York (2020).

¹³ See Bank of England (2020a) and SIX (2020).

¹⁴ See FSB (2018). The FSB OSSG also published a guide on using RFRs and RFR-based backward-looking term rates in cash products (see FSB (2019a)).

¹⁵ For these market participants, using fixed rates could be considered as an alternative (see Working Group on Sterling Risk-Free Reference Rates (2020)).

¹⁶ See Working Group on Sterling Risk-Free Reference Rates (2019a) and ARRC (2020d).

¹⁷ See Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks (2019) and Amamiya (2020).

¹⁸ See NWG (2018).

¹⁹ In September 2018, ISDA already published the ISDA Benchmarks Supplement, which market participants can make use of to improve the contractual robustness of derivatives. The ISDA Benchmarks Supplement contains generic fallback provisions that can be used as an interim solution for contracts referencing IBORs (see ISDA (2018)).

²⁰ See FSB (2019d), Schooling Latter (2019) and FCA (2020a).

²¹ See FSB (2019b). Options on SOFR futures have been available for trading since January 2020 (see CME Group (2019a)). CCPs are expected to migrate to SOFR for discounting and PAI in October 2020 (see CME Group (2019b) and LCH (2019c)).

²² See Bank of England (2019).

²³ See Schooling Latter (2019).

ations.²⁴ The discontinuation of existing reference rates, such as EONIA and LIBOR, will necessitate adjustments to the Eurosystem's collateral framework for monetary policy operations, too. In addition to the first SONIA-based loans, pilot projects for RFR-based loans in other LIBOR currencies have already been launched or are being planned.²⁵ At the same time, however, substantial new LIBOR exposures with maturities beyond 2021 are still being built up in many areas.

As in all other countries in which LIBOR is used, market participants in the euro area will have to prepare for the discontinuation of the rates and the use of the respective RFRs or new RFR-based products. Germany will be no exception. The significant banks in Germany (i.e. those that are supervised by the Single Supervisory Mechanism, SSM) have substantial LIBOR exposures, in par-

ticular for USD LIBOR and, to a lesser extent, GBP LIBOR.

²⁴ As of October 2020, the Bank of England will already begin gradually increasing haircut add-ons and will no longer accept collateral referencing LIBOR issued on or after that date (see Bank of England (2020b)).

²⁵ See, for example, Fannie Mae (2019), Freddie Mac (2019), RBS (2019), Shell (2019) or UBS (2019). In the United States, the government-sponsored enterprises that finance mortgages, Fannie Mae and Freddie Mac, will no longer accept adjustable-rate mortgages referencing LIBOR as of 2021 (see FHFA (2020)).

ing several currencies, such as cross-currency swaps or loans to non-financial corporations that can be drawn down in multiple currencies, where the transactions reference RFRs for other currencies.⁹¹ Moreover, new conventions in other markets, such as the transition in the sterling bond market from GBP LIBOR to SONIA, could also play a role. The first €STR bonds have already been issued, for instance.⁹²

■ Outlook

Current global developments in benchmark reform are ushering in sweeping changes that affect a large number of business areas and stakeholders and pose major challenges to the market participants involved. For the euro area, the introduction of the €STR marks the first big step in the path of reform towards using robust risk-free reference rates. It is now up to market participants across the board to actively pursue the use of the €STR and establish liquid, €STR-

based markets. The transition from EONIA to the €STR, including the amendment of contracts referencing EONIA, needs to be completed in full by the end of 2021. At the same time, workable €STR-based fallback provisions need to be incorporated into contracts referencing EURIBOR in order to improve their robustness. Despite the fact that the reformed EURIBOR can continue to be used as a benchmark rate beyond 2021, market participants should be prepared for all eventualities. With that in mind, robust fallbacks should also be integrated into legacy contracts, wherever possible.⁹³ In future, market participants could likewise consider using the €STR or €STR-based term rates as a direct alternative to EURIBOR for certain instruments or contracts.

⁹¹ See ARRC (2020b) and FSB (2019b). The first cross-currency swaps referencing RFRs have already been traded (see ARRC (2020c)).

⁹² See, for example, EIB (2019) and KfW (2019).

⁹³ For contracts that were entered into from 1 January 2018 and that fall within the scope of the BMR, this is already mandatory under the BMR.

Introduction of the €STR means sweeping changes for use of benchmarks, ...

... which will require careful preparation and rapid implementation in order to contribute to a more robust financial system

The aforementioned work to be done is extensive and time-consuming and its effects varied. For example, the steps that need to be taken by market participants include offering new products, preparing for their use and actively contributing to establishing liquid markets. Additionally, it will be necessary to amend or redraft contracts and to review and adapt existing processes, models and IT systems. Within the scope of implementing changes to contracts and valuation parameters, the potential implications of commercial law also need to be explored and, if necessary, taken into account. In this context, careful, extensive preparation and rapid implementation of these changes are key. This will contribute to an orderly transition and will ultimately support the functioning and resilience of the financial system. Furthermore, market participants need to prepare for the discontinuation of LIBOR after 2021. This also means that market participants in Germany and the euro area are making arrangements to use the relevant RFR (or RFR-based backward-looking compounded term rates) as the default rate in their foreign currency operations in future. As the various RFRs differ in terms of their design and IBORs will continue to be available in some currency areas, market participants will, going forward, be operating in an international environment in which a variety of benchmark rates with differing features coexist. Supervisory authorities will monitor the progress made during the transition period. For example, the CEOs of institutions supervised under the SSM have already been asked to provide an initial overview of their preparedness with respect to changes to be implemented in connection with EONIA, EURIBOR and LIBOR.⁹⁴

Comprehensive information and communication are sine qua non for smooth transition

Given the complexity of the topic and the large number of stakeholders involved, transparency and targeted communication are essential. It is important to bear in mind here that the level of information of each group of stakeholders varies greatly. To make the transition as smooth as possible, comprehensive and target group-

specific information is needed – not least for market participants outside the financial sector.

The necessary reform processes require dialogue and cooperation between the public and private sector. Central banks are playing a key supporting role in this regard. The Eurosystem is making a fundamental contribution, with the ECB providing the euro risk-free rate in the form of the €STR and facilitating private sector efforts by supporting the private sector's working group on euro risk-free rates. As a member of the FSB OSSG, it is also involved in international coordination at the public sector level. As part of the Eurosystem, the Bundesbank contributes to the production of the €STR and liaises with market participants in Germany. Furthermore, it is the public sector's task to look into potential regulatory hurdles in connection with the reform processes and to address any interpretation issues.⁹⁵ At the same time, it is the responsibility of market participants as the key users of benchmarks to develop and implement appropriate transitional arrangements and solutions, both as part of market initiatives and individually, which meet their needs and requirements while taking account of the framework conditions with which they have to comply. Going forward, too, it is therefore important to strike the right balance between private sector responsibility and public sector support.

Central banks play key role in supporting transition led by private sector

⁹⁴ See ECB (2019i). In Germany, BaFin and the Bundesbank have similarly contacted selected institutions domiciled in Germany that do not fall under the scope of the SSM. Supervisory authorities outside the euro area have also sent "Dear CEO" letters (see FCA and PRA (2018, 2020) and FCA (2020b)).

⁹⁵ See FSB (2019b). For various issues which, according to the private sector, require clarification by the public sector, see also, for example, the letter from the Chair of the working group on euro risk-free rates to ESMA and the European Commission (see Van Rijswijk (2019)), the letter from the working group on euro risk-free rates to the IASB (see Working group on euro risk-free rates (2019d)), ECB (2019h) and the letters from the Working Group on Sterling Risk-Free Reference Rates to, inter alia, the European Commission and the Basel Committee on Banking Supervision (BCBS) (see Working Group on Sterling Risk-Free Reference Rates (2019b, 2019c)).

■ List of references

Amamiya, M. (2020), Interest Rate Benchmark Reform in Japan, speech delivered at the Kin'yu Konwa Kai, Jiji Press, 30 January 2020.

ARRC (2020a), ARRC Releases a Proposal for New York State Legislation for U.S. Dollar LIBOR Contracts, press release, 6 March 2020.

ARRC (2020b), Recommendations for Interdealer Cross-Currency Swap Market Conventions, January 2020.

ARRC (2020c), Newsletter, December 2019 – January 2020. Available at <https://www.newyorkfed.org/arrc>

ARRC (2020d), The ARRC's Paced Transition Plan for Developing SOFR Markets is Ahead of Schedule. Available at <https://www.newyorkfed.org/arrc>

Bailey, A. (2019), LIBOR: preparing for the end, speech delivered at the Securities Industry and Financial Markets Association's (SIFMA) LIBOR Transition Briefing in New York, United States, 15 July 2019.

Bailey, A. (2018), Interest rate benchmark reform: transition to a world without LIBOR, speech delivered at Bloomberg, London, United Kingdom, 12 July 2018.

Bailey, A. (2017), The future of LIBOR, speech delivered at Bloomberg London, United Kingdom, 27 July 2017.

Bank of England (2020a), Supporting Risk-Free Rate transition through the provision of compounded SONIA, Discussion Paper, 26 February 2020.

Bank of England (2020b), The Bank's risk management approach to collateral referencing LIBOR for use in the Sterling Monetary Framework, Market Notice, 26 February 2020.

Bank of England (2019), Progress on the transition away from Libor, Financial Stability Report, Issue No 46, December 2019, pp. 72-74.

Bank of England (2018), SONIA reform implemented, press release, 23 April 2018.

Bindseil, U. (2014), Monetary Policy Operations and the Financial System, Oxford University Press, 2014.

BIS (2019), Beyond LIBOR: a primer on the new reference rates, BIS Quarterly Review, March 2019.

CME Group (2020), €STR Discounting & Price Alignment Transition Plan for Cleared EUR Interest Rate Swap Products, 31 January 2020.

CME Group (2019a), Trading SOFR Options, 16 December 2019.

CME Group (2019b), SOFR Discounting & Price Alignment Transition Plan for Cleared USD Interest Rate Swaps, 3 December 2019.

Cœuré, B. (2019), A tale of two money markets: fragmentation or concentration, speech delivered at the ECB workshop on money markets, monetary policy implementation and central bank balance sheets, Frankfurt am Main, 12 November 2019.

Cœuré, B. (2018), Waiting for ESTER: the road ahead for interest rate benchmark reform, speech delivered at the meeting of the ECB Money Market Contact Group, Frankfurt am Main, 25 September 2018.

Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks (2019), Final Report on the Results of the Public Consultation on the Appropriate Choice and Usage of Japanese Yen Interest Rate Benchmarks, November 2019.

Deutsche Bundesbank (2019a), Longer-term changes in the unsecured interbank money market, Monthly Report, September 2019, pp. 59-76.

Deutsche Bundesbank (2019b), Methodik der Euro Short-Term Rate, last updated: 2 October 2019.

Deutsche Bundesbank (2017), The Eurosystem's new money market statistical reporting – initial results for Germany, Monthly Report, October 2017, pp. 57-66.

Dombrovskis, V. (2019a), letter to S. van Rijswijk, 2 October 2019. Available at https://www.ecb.europa.eu/paym/initiatives/interest_rate_benchmarks/WG_euro_risk-free_rates/shared/pdf/20191016/2019-10-16_WG_on_euro_RFR_meeting_Item_9_Reply_letter_EU_Commission_on_EMIR_requirements_in_the_context_of_the_benchmarks_reform.pdf, accessed on 10 March 2020.

Dombrovskis, V. (2019b), letter to the EACB, EBF and ESBG, 3 September 2019. Available at https://www.ebf.eu/wp-content/uploads/2019/09/2019-09-03-VP-Dombrovskis-EACB_EBF_ESBG.pdf, accessed on 10 March 2020.

ECB (2020), Euro short-term rate (€STR) questions and answers. Available at <https://www.ecb.europa.eu>

ECB (2019a), What are benchmark rates, why are they important and why are they being reformed?, 11 July 2019.

ECB (2019b), ECB changes the acronym for its euro short-term rate, press release, 12 March 2019.

ECB (2019c), Euro money market study 2018, September 2019.

ECB (2019d), Meeting of the working group on euro risk-free rates held in Frankfurt am Main on Wednesday, 16 October 2019, Summary, 21 November 2019.

ECB (2019e), Working group on euro risk-free rates recommends transition path from EONIA to €STR and €STR-based forward-looking term structure methodology, press release, 14 March 2019.

ECB (2019f), ECB provides a one-off spread between €STR and EONIA, press release, 31 May 2019.

ECB (2019g), Goodbye EONIA, welcome €STR!, Economic Bulletin 7/2019, pp. 23-24.

ECB (2019h), Meeting of the working group on euro risk-free rates held in Frankfurt am Main on Wednesday, 4 December 2019, Summary, 20 December 2019.

ECB (2019i), Banks' preparation with regard to interest rate benchmark reforms and the use of risk-free rates, 3 July 2019.

ECB (2018a), Private sector working group on euro risk-free rates recommends ESTER as euro risk-free rate, press release, 13 September 2018.

ECB (2018b), First public consultation by the working group on euro risk-free rates on the assessment of candidate euro risk-free rates – Summary of responses, August 2018.

ECB (2017a), ECB to publish new unsecured overnight interest rate, press release, 21 September 2017.

ECB (2017b), Joint press release FSMA, ESMA, ECB and EC: New working group on a risk-free reference rate for the euro area, press release, 21 September 2017.

ECB (2017c), Terms of reference for the Working Group on Euro Risk-Free Rates, 29 November 2017. Available at https://www.ecb.europa.eu/paym/initiatives/interest_rate_benchmarks/WG_euro_risk-free_rates

ECB (2017d), First ECB public consultation on developing a euro unsecured overnight interest rate, November 2017.

EIB (2019), EIB issues market's first €STR EUR Benchmark with EUR 1bn 3y issuance, 2 October 2019.

EMMI (2019a), EMMI publishes stakeholder consultation feedback summary on recommendations for EONIA by the euro risk-free rates working group, press release, 31 May 2019.

EMMI (2019b), EURIBOR Transparency Indicators, December 2019.

EMMI (2019c), EMMI confirms the successful completion of the phase-in of all EURIBOR panel banks to the hybrid methodology, press release, 28 November 2019.

EMMI (2018), State of Play of the EONIA Review, press release, February 2018.

EMMI (2015), EMMI launches stakeholder consultation on the evolution of EURIBOR, press release, 30 October 2015.

ESMA (2019), Questions and Answers On the Benchmarks Regulation (BMR), Version 16, 11 December 2019.

ESMA and EBA (2013), ESMA-EBA Principles for Benchmark-Setting Processes in the EU, 6 June 2013.

Eurex Clearing (2019a), Transition from EONIA to the euro short-term rate (€STR), Eurex Clearing Circular 071/2019, 11 July 2019.

Eurex Clearing (2019b), EurexOTC Clear service: Discounting switch from EONIA to €STR for cleared OTC EUR derivatives, Eurex Clearing Circular 096/2019, 23 October 2019.

European Commission (2019), Public Consultation Document: Review of the EU Benchmark Regulation. Available at <https://ec.europa.eu>

Fannie Mae (2019), LIBOR-SOFR Transition, 15 November 2019.

FCA (2020a), letter to ISDA, 20 January 2020. Available at <https://www.isda.org/a/E1LTE/FCA-letter-to-ISDA-on-Non-representative-LIBOR-January-2020.pdf>, accessed on 10 March 2020.

FCA (2020b), Asset management firms: prepare now for the end of LIBOR, 27 February 2020.

FCA and PRA (2020), Next steps on LIBOR transition, 16 January 2020.

FCA and PRA (2018), Firms' preparations for transition from LIBOR to risk-free rates, 19 September 2018.

Federal Ministry of Finance (1998), Entwurf, FIBOR-Überleitungs-Verordnung (FIBOR-VO), 27 May 1998. Available at https://www.ecb.europa.eu/ecb/legal/pdf/de_proposal_con_1998_32.pdf, accessed on 10 March 2020.

Federal Reserve Bank of New York (2020), Statement Regarding Publication of SOFR Averages and a SOFR Index, 12 February 2020.

FHFA (2020), FHFA Announces Fannie Mae and Freddie Mac Update on LIBOR Transition, 5 February 2020.

Folter, B. (1998), Die zivilrechtlichen Auswirkungen der Einführung des Euro auf Bankgeschäfte nach deutschem und französischem Recht, Peter Lang, Frankfurt am Main, 1998.

Freddie Mac (2019), Important Single-Family Updates on the LIBOR-SOFR Transition, 15 November 2019.

FSB (2019a), Overnight Risk-Free Rates, A User's Guide, 4 June 2019.

FSB (2019b), Reforming major interest rate benchmarks, Progress report, 18 December 2019.

FSB (2019c), FSB work programme for 2020, 17 December 2019.

FSB (2019d), FSB letter to ISDA on pre-cessation triggers, 19 November 2019.

FSB (2018), Interest rate benchmark reform – overnight risk-free rates and term rates, 12 July 2018.

FSB (2017), Reforming major interest rate benchmarks, Progress report on implementation of July 2014 FSB recommendations, 10 October 2017.

FSB (2014), Reforming Major Interest Rate Benchmarks, 22 July 2014.

FSMA (2019a), The FSMA authorises EMMI as administrator of the EONIA benchmark, press release, 13 December 2019.

FSMA (2019b), The FSMA authorises EMMI as administrator of the EURIBOR benchmark, press release, 3 July 2019.

G20 (2020), Communiqué, G20 Finance Ministers & Central Bank Governors Meeting, 22-23 February 2020, Riyadh, Saudi Arabia.

IASB (2019), IASB amends IFRS Standards in response to the IBOR reform, 26 September 2019.

IBA (2020), LIBOR. Available at <https://www.theice.com/iba/libor>, accessed on 10 March 2020.

ICE (2020), One Month Euro Overnight Rate Index Future, Product Specs. Available at <https://www.theice.com>

ICE (2018), ICE Benchmark Administration becomes authorised benchmark administrator under EU Benchmark Regulation, press release, 30 April 2018.

ICMA (2019), ICMA ERCC Committee, Repo market best practice with respect to the transition from EONIA to €STR, Memorandum, 2 July 2019.

IOSCO (2013), Principles for Financial Benchmarks, Final Report, July 2013.

ISDA (2020a), ISDA Publishes Results of Consultation on Fallbacks for Derivatives Referencing Euro LIBOR and EURIBOR, press release, 24 February 2020.

ISDA (2020b), ISDA Launches New Consultation on Pre-cessation Fallbacks, press release, 25 February 2020.

ISDA (2019a), Interbank Offered Rate (IBOR) Fallbacks for 2006 ISDA Definitions, Supplemental Consultation on Spread and Term Adjustments, including Final Parameters thereof, for Fallbacks in Derivatives Referencing EUR LIBOR and EURIBOR, as well as other less widely used IBORs, 18 December 2019.

ISDA (2019b), ISDA IBOR Fallback Update, presentation, meeting of the working group on euro risk-free rates, Frankfurt am Main, 16 October 2019.

ISDA (2018), ISDA Publishes Benchmarks Supplement, press release, 19 September 2018.

KfW (2019), KfW successfully launches its inaugural floating rate note linked to the Euro Short-Term Rate (€STR), 13 November 2019.

LCH (2019a), Benchmark Reform impact on SwapClear EUR Products, LCH Circular No 4044, 6 September 2019.

LCH (2019b), Transition to €STR discounting in SwapClear, LCH Circular No 4052, 27 September 2019.

LCH (2019c), SOFR Discounting: LCH Plan for the SwapClear Compensation Process, Q4 2019. Available at <https://www.lch.com/sites/default/files/media/files/SOFR-Discounting.pdf>, accessed on 10 March 2020.

Maijoor, S. (2019), Introductory remarks, Second roundtable on euro risk-free rates, 25 September 2019.

NWG (2018), Minutes from the meeting of the National Working Group on CHF Reference Interest Rates (31 October 2018), 14 November 2018.

RBS (2019), NatWest completes market's first SONIA loan for National Express, 2 July 2019.

Schooling Latter, E. (2019), Next steps in transition from LIBOR, speech delivered at the Risk.net LIBOR Summit, London, United Kingdom, 21 November 2019.

Shell (2019), Shell signs innovative \$10 billion revolving credit facility, 13 December 2019.

SIX (2020), Compounded SARON for illustrative purposes. Available at <https://www.six-group.com>

UBS (2019), UBS provides first SARON real estate financing in Switzerland, 29 November 2019.

Van Rijswijk, S. (2019), IBOR Transition and EMIR grandfathering, letter to ESMA and the European Commission, 2 July 2019. Available at https://www.ecb.europa.eu/paym/initiatives/interest_rate_benchmarks/WG_euro_risk-free_rates/shared/pdf/20190704/2019_07-04_Item_2_Letter_to_European_authorities_on_EMIR_margin_requirements.pdf, accessed on 10 March 2020.

Wheatley, M. (2012), The Wheatley Review of LIBOR: final report, September 2012.

Working group on euro risk-free rates (2020a), Report by the working group on euro risk-free rates on the transfer of EONIA's cash and derivatives markets liquidity to the €STR, 19 February 2020.

Working group on euro risk-free rates (2020b), Public consultation by the working group on euro risk-free rates on Swaptions impacted by the CCP discounting transition from EONIA to the €STR, 13 March 2020.

Working group on euro risk-free rates (2019a), Report by the working group on euro risk-free rates on €STR fallback arrangements, 12 November 2019.

Working group on euro risk-free rates (2019b), Report by the working group on euro risk-free rates on the impact of the transition from EONIA to the €STR on cash and derivatives products, August 2019.

Working group on euro risk-free rates (2019c), Report by the working group on euro risk-free rates on the risk management implications of the transition from EONIA to the €STR and the introduction of €STR-based fallbacks for EURIBOR, 17 October 2019.

Working group on euro risk-free rates (2019d), Report by the working group on euro risk-free rates on the financial accounting implications of the transition from EONIA to the €STR and the introduction of €STR-based fallbacks for EURIBOR, 5 November 2019.

Working group on euro risk-free rates (2019e), Recommendations of the working group on euro risk-free rates on the EONIA to €STR legal action plan, 16 July 2019.

Working group on euro risk-free rates (2019f), Report by the working group on euro risk-free rates, High level recommendations for fallback provisions in contracts for cash products and derivatives transactions referencing EURIBOR, 6 November 2019.

Working group on euro risk-free rates (2019g), Item 3: Update by subgroup 2 on term rates methodologies, presentation, meeting of the working group on euro risk-free rates, Frankfurt am Main, 29 August 2019.

Working group on euro risk-free rates (2019h), Guiding principles for fallback provisions in new contracts for euro-denominated cash products, January 2019.

Working group on euro risk-free rates (2018a), Report by the working group on euro risk-free rates on the transition from EONIA to ESTER, December 2018, revised March 2019.

Working group on euro risk-free rates (2018b), Second public consultation by the working group on euro risk-free rates on determining an ESTER-based term structure methodology as a fallback in EURIBOR-linked contracts, December 2018.

Working Group on Sterling Risk-Free Reference Rates (2020), Use Cases of Benchmark Rates: Compounded in Arrears, Term Rate and Further Alternatives, January 2020.

Working Group on Sterling Risk-Free Reference Rates (2019a), Newsletter, December 2019. Available at <https://www.bankofengland.co.uk/markets/transition-to-sterling-risk-free-rates-from-libor>

Working Group on Sterling Risk-Free Reference Rates (2019b), Removal of pan-European regulatory barriers to transition away from LIBOR and other IBORs, letter to the European Commission, 23 October 2019.

Working Group on Sterling Risk-Free Reference Rates (2019c), Regulatory capital impediments to transition from 'IBOR' to new Risk-Free Rate ("RFR") Framework, letter to the Basel Committee on Banking Supervision (BCBS), 23 October 2019.