



BANK FOR INTERNATIONAL SETTLEMENTS



## Towards better reference rate practices: a central bank perspective

A report by a Working Group established by the BIS Economic Consultative Committee (ECC) and chaired by Hiroshi Nakaso, Assistant Governor, Bank of Japan

March 2013

This publication is available on the BIS website ([www.bis.org](http://www.bis.org)).

© *Bank for International Settlements 2013. All rights reserved. Brief excerpts may be reproduced or translated provided the source is stated.*

ISBN 92-9131-919-8 (print)

ISBN 92-9197-919-8 (online)

# Towards better reference rate practices: a central bank perspective

Report prepared by a Working Group established by the BIS  
Economic Consultative Committee (ECC)

## Contents

Executive summary .....	1
1. Introduction .....	3
2. Determinants of private sector reference rate choices.....	4
2.1 <i>The benefits of using reference rates</i> .....	4
2.2 <i>Properties of a good reference rate</i> .....	6
2.3 <i>Reference rate properties and applications: do they match?</i> .....	7
2.4 <i>Obstacles to a transition to other reference rates</i> .....	8
3. Reference interest rates, monetary policy and financial stability .....	10
3.1 <i>General economic effects of the use of reference interest rates</i> .....	10
3.2 <i>Implications for monetary policy transmission</i> .....	11
3.3 <i>Financial stability aspects</i> .....	12
4. Towards better reference rate practices.....	13
4.1 <i>Enhancing the reliability and robustness of reference rates</i> .....	14
4.2 <i>Facilitating reference rate choices</i> .....	16
5. Concluding remarks and recommendation .....	21
References .....	23
Annex 1: ECC Working Group on financial market reference rates	
Terms of Reference .....	24
Annex 2: Summary of roundtable discussions between central banks and market participants .....	26
Annex 3: Swap market activity .....	29
Annex 4: Members of the Working Group .....	31
Annex 5: Central banks providing input to the Working Group process.....	32



## Executive summary

This Report reviews issues in relation to the use and production of reference interest rates from the perspective of central banks. These issues reflect the possible risks for monetary policy transmission and financial stability that may arise from deficiencies in the design of reference interest rates, market abuse, or from market participants using reference interest rates which embody economic exposures other than the ones they actually want or need. In parallel to initiatives in other forums and jurisdictions, including work by the International Organization of Securities Commissions (IOSCO), the European Banking Authority (EBA) / European Securities and Markets Authority (ESMA) and the UK Wheatley Review, the Report provides recommendations on how to improve reference rate practices from a central bank perspective. The Working Group (WG) identifies an urgent need to strengthen the reliability and robustness of existing reference rates and a strong case for enhancing reference rate choice. Both call for prompt action by the private and the public sector.

Several recent developments in particular have highlighted the need for changes to current reference rate practices. First, cases of market manipulation have raised concerns about the reliability of several key reference interest rates and the appropriateness of the processes and methodologies used in formulating them. Second, the sharp contraction in market activity since 2007 has raised questions about the robustness and usefulness of reference interest rates based on term unsecured interbank markets (eg Libor, Euribor, Tibor), particularly in periods of stress. In addition, structural change in derivatives markets, such as the wider use of collateral and the move to centrally clear standardised OTC derivatives transactions, may add to the demand for reference rates that do not embody bank credit risk. As a result, there is a consensus within the Group that there is demand for a range of reference interest rates that are suitable for different purposes.

These developments and the current procedures that produce reference interest rates have potential implications for monetary policy transmission and financial stability. From a monetary policy transmission perspective, reference rates may behave in unexpected ways especially in periods of stress. As a result, economy-wide financing conditions may change in unpredictable and unintended ways. Such risks could be exaggerated when market participants heavily rely on a single reference rate whose components are likely to be volatile in stressed environments. Moreover, cross-border factors may distort the relationship between monetary policy and the key reference rate(s) used in the domestic economy.

A more reliable and robust reference interest rate framework also has many potential benefits in terms of greater financial stability. First, a loss of confidence in reference rates, because they had been shown to be unreliable, could lead to market functioning disruption, especially as some contracts do not have robust fallback arrangements. Second, poorly conceived reference rates could transfer risks, particularly those related to bank funding costs, in inappropriate ways. Similarly, they could transfer pricing errors across financial markets or create greater and unnecessary basis risk. Finally, unreliable reference rates may impair the central bank's ability to respond to financial fragilities in an effective manner.

The WG is of the view that a sound framework for producing reference rates is essential for well-functioning markets. Both the private and public sectors therefore face an immediate need to ensure that reference rates are reliable and robust, and thus adequately governed and administered to appropriately guard against market abuse or systematic errors. Promoting a sound rate setting process based on greater use of transaction data combined with the transparent and appropriate use

of expert judgment would enhance the resilience of reference rates. Steps should also be taken to ensure contracts have robust fallback arrangements for use in the event that the main reference rate is not produced.

This suggests an important role for the official sector in the development of commonly agreed principles to strengthen governance frameworks that enhance the reliability and robustness of reference rates. If the level of governance and administration of existing or modified reference rates are unsatisfactory, then central banks and the public sector may need to work with the private sector in the effort to create sufficiently robust and reliable reference rates and will need to stand ready to help overcome any potential barriers to their adoption. While the official sector has a role to play in developing commonly agreed principles and the strengthening of governance frameworks, choice among appropriately governed and administered reference rates should be left to private sector participants.

There is a range of possible measures central banks could take to deal with such issues. Collaborating with domestic and international regulatory bodies, central banks should work within currently ongoing reform processes to enhance the governance and administration of reference rates. Central banks should work cooperatively with relevant domestic regulators and authorities in developing guidance to encourage private entities to use sufficiently reliable and robust reference rates that are most suited for individual needs. They should also, where appropriate, work cooperatively with relevant authorities to help utilise existing regulatory and supervisory powers in evaluating rate submission processes at regulated institutions.

Market participants should have the choice between a range of reliable and robust interest rates for different uses. In particular, developing widely accepted and liquid reference rates not containing banking sector credit risk for managing exposure to interest rate risk could be beneficial. Again, the private sector should have an interest in seeking greater diversity in reference rates that better match market participants' individual needs. This includes a strong self-interest in contributing to the setting of reference rates to ensure that they are representative of actual market conditions. But there may be market failures, including network externalities, underinvestment in the production of alternative reference rates, and insufficient coordination among market participants. Moreover, there would be sizeable transition issues around any changes given the size of these markets.

Central banks have a range of options available to promote additional choices, including encouraging a rebalancing away from current mainstream reference rates which embed banking sector credit risk, and to alleviate constraints on transition. At the moderate end of the scale, they could encourage change by promoting improvements to the transparency of markets from which reference rates are derived. In order to enhance reference rate choice, central banks can promote the development and improvement of (near) credit risk free reference rates such as overnight rates and overnight index swap (OIS) rates or general collateral (GC) repo rates. Public authorities could also help bring together market participants or industry groups to coalesce around any changes and help smooth any transition. Central banks could, in some cases, even play a more active role by, for example, becoming directly involved in reference rate design and production, although robustness will ultimately depend on a sound rate setting process based on a liquid market. The actual form of involvement will depend on the extent of market failure and country- or currency area-specific circumstances, including market structures and regulatory and institutional arrangements. The issue of diversity is important, and action in this area by both the private and the public sector should start as soon as possible.

## 1. Introduction

Reference rates are commonly used interest rates that link payments in a financial contract to standard money market interest rates. A large number of reference interest rates are being used in domestic and international financial markets, covering a wide range of unsecured and secured money markets in many currencies. As a consequence, the way reference rates are produced and used is important for the functioning of financial markets.

Reference rates based on unsecured interbank term lending and borrowing have become dominant, partly because they facilitate the management of bank funding risk, but also because they were the first types of rates to be introduced and have emerged as the market standard over time. These rates are now deeply embedded in financial systems, especially in loan and interest rate derivatives contracts.<sup>1</sup>

Cases of market manipulation have raised concerns about the appropriateness of the processes and methodologies used in formulating reference interest rates. These cases reflect both the incentives to manipulate submissions – eg the potential to profit in a large derivatives market that relies on reference rates and the desire during the financial crisis to avoid the stigma associated with relatively high submissions – and a relatively weak governance structure.

Initiatives in a number of forums and different jurisdictions are reviewing how this might be improved, including the UK Treasury Wheatley Review of Libor, EBA/ESMA, and IOSCO. The private and public sectors face an immediate need to ensure that reference rates are adequately governed and administered in order to appropriately guard against market abuse or systematic errors. If existing or modified reference rates are unable to fulfil appropriate governance and administration principles, then central banks and the broader public sector may need to work with the private sector in the effort to create reference rates that do meet this criterion and will need to stand ready to help overcome any potential barriers to their adoption.

Although choices amongst appropriate governed and administered reference rates should be left up to private sector participants, there is a wider question of whether the dominance of rates based on unsecured interbank markets is still economically appropriate. These markets have shrunk following the financial crisis, and the dispersion of bank credit risk has increased sharply, making average rates for unsecured interbank funding a less good proxy for bank funding costs. Moreover, the volatility of bank credit risk premia has made such rates a less appropriate proxy for risk free rates. Market participants must factor these considerations into their choices around alternatives.

Changes in the structure of money markets (eg greater reliance on secured funding) and derivatives markets (eg shift towards central clearing) point to a greater need for reference rates that can be used to manage exposures that involve

<sup>1</sup> According to BIS statistics, more than 50% of all syndicated loans signed in 2011 are linked to either Libor or Euribor. A significant fraction of the world's bonds – to the tune of at least \$10 trillion – reference one of these two rates. In addition, a significant share of mortgages and other retail loans are linked to these reference rates. Reference rate use in derivatives markets is also very widespread.

little, or no, credit risk. These changes suggest that there is scope for greater diversity in the use of reference rates, notwithstanding that there will continue to be an important role for reference rates that reflect bank unsecured funding costs to meet specific needs. If central banks believe that there are market or regulatory impediments that prevent private sector participants from adopting economically appropriate alternatives in their jurisdictions, then the public sector should consider measures that could remove impediments and encourage this transition.

Against this backdrop, the Economic Consultative Committee (ECC) agreed in September 2012 to set up a Working Group to examine issues related to the design and choice of reference interest rates in financial markets from a central bank perspective. The Group, chaired by Hiroshi Nakaso (Assistant Governor, Bank of Japan), distinguishes its work from other work in this area by focusing on the role of reference interest rates from a central bank perspective.

The Group examined a broad range of reference rates. Based on this work, and with a view to aiding market choices, the Group has developed views on what features reliable reference rates should have and formulated recommendations on how reference rates could be made more robust under various states of financial markets, including times of stress. It has not focused on issues surrounding administration, governance and oversight of the production process, which are being extensively reviewed elsewhere, including by IOSCO, the EBA/ESMA, the Wheatley Review, and reviewed by the CFTC in published orders of specific cases. The main objective is to provide central bank input into the wider official sector debate coordinated by the Financial Stability Board (FSB). Annex 1 contains the Group's Terms of Reference.

This Report presents the Group's conclusions. It is based on fact-finding and analysis by Group members, including a review of related central bank research and consultations with the private sector. The consultations were mainly done via a series of three regional roundtables (in London, New York and Singapore), which brought together private sector reference rate setters, producers and users from about 50 institutions as well as representatives from central banks. These discussions are summarised in Annex 2.

The Report is structured as follows. Section 2 examines the determinants of the private sector's choice of reference rates. It also sheds light on the factors that could impede the private sector from switching from the current reference rate choices to alternatives. Section 3 discusses the monetary policy and financial stability implications of the use of reference interest rates. Section 4 discusses what role public authorities – including central banks – could play in facilitating greater choice for market participants and in strengthening the reliability and robustness of reference rates. Section 5 concludes.

## 2. Determinants of private sector reference rate choices

### *2.1 The benefits of using reference rates*

Using reference rates links payoffs in a financial contract to standard money market interest rates. Compared to a situation where each individual contract refers to its own customised interest rate, the use of reference rates reduces the complexity of financial contracts and facilitates their standardisation. This lowers transaction costs and enhances market liquidity, especially if reference rates are widely used. And by



encouraging active trading and increasing the coordination of individual contracts, reference rates reduce the costs of reallocating risks in the financial system.

In principle, any market interest rate can serve as a reference rate. Typically, widely used reference rates reflect general conditions in a well-defined market. Conceptually, different reference rates can be distinguished by the price (or risk) components they include, which can help determine their suitability for different uses. As discussed in Box 1, one important distinction is whether or not a reference rate contains a component related to bank credit risk.<sup>2</sup>

Box 1

## Components and uses of reference interest rates

One standard way of de-composing market interest rates is to divide them into a risk free rate and several risk premia, including a term premium, a liquidity risk premium and a credit risk premium. The significance of these risk premia differs across instruments: term premia tend to increase with the maturity of the underlying instrument; the liquidity risk premium depends on the ease with which the money market instrument can be traded; and the credit risk premium depends on the perceived credit quality of the borrower and, in secured funding markets, the collateral.<sup>①</sup>

Hence, the use of a particular interest rate as reference rate implies a choice about the risk components that one contract party transfers to the other. It also determines to what extent a reference rate provides an effective hedge (or, more generally, is an effective means for managing different types of financial risk).

Reference rates that are based on unsecured interbank markets comprise a risk free rate and a credit risk premium that reflects the perceived common credit risk of the sample of banks contributing to the reference rate ("common bank risk").<sup>②</sup>

Some users may want the common bank risk component to be in the reference rate. In particular, banks may prefer a reference rate that captures banking sector funding costs. Using such rates in loan contracts provides a proxy hedge against funding cost risks by passing the common bank funding cost risk on to the borrower (leaving the bank only with its bank-specific funding cost risk, which is more controllable by the bank).

For other purposes, users may want a reference rate that is free of common bank risk. For example, managing the cash flows from an interest rate swap may call for a reference rate with little or no credit risk. Yet other users may prefer reference rates with different risk components (eg the issuer of a non-financial corporate bond may wish to have a common corporate sector risk premium instead of a common bank premium in the reference rate).

- ① Decomposing reference rates into their components in practice is not easy. There do, however, seem to be some empirical patterns. First, liquidity risk premia seem to be relatively more important for shorter tenors (see Gefang et al (2011) and Nobili (2012)). Second, the credit risk premium typically becomes more important the longer the tenor of the loan. Moreover, there is some evidence that the common bank credit risk premium was more important during the financial crisis (see Gefang et al (2011) and Angelini et al (2009)).
- ② The size and behaviour of the common bank risk component depends on a number of reference rate-specific factors, including the size and composition of the sample of contributing banks, whether quotes are provided for "prime banks" or a broader range of banks. A reference rate also embeds components that reflect the term and liquidity premia incorporated in the underlying market interest rates. These components are not considered further in this Report.

<sup>2</sup> Reference rates can be distinguished from benchmark indices, which are widely used to measure performance (eg of an asset manager), but are not necessarily used as reference prices in financial contracts.

## *Main applications*

The two main uses of reference interest rates are determining payments on the **floating rate legs of loans/notes** and interest rate derivatives. Referencing rates based on unsecured interbank markets has historically been seen as a convenient way for lending banks to share the risk of future changes in their funding costs with borrowers (see Box 1).

Reference rates are also used in derivatives contracts aimed at managing interest risk. Indeed, there are large markets for exchange-traded **derivatives** – typically futures contracts – referencing particular interest rates. In OTC derivatives markets there are also very large amounts outstanding of interest rate swaps and cross-currency swaps as well as credit derivatives that embed existing reference rates.

While mainly used for determining contractual payments, reference rates are also embedded in the global financial system through other applications. These include their widespread use for the valuation of financial instruments, as many market participants rely on discounting of cash flows using yield curves directly or indirectly based on reference rates. As a result, reference rates are also an integral part of risk management, asset-liability management, performance measurement and compensation schemes, credit ratings and accounting practices.

## *2.2 Properties of a good reference rate*

A number of official sector organisations are looking at processes around reference rates to make them both more reliable and more robust. The reliability of reference rates – the extent to which their governance and administration adequately safeguard against manipulation or error – has recently come into question. It is of critical importance that any reference rate has proper oversight to prevent abuses and errors. The robustness of a reference rate – understood as its availability even under stressful market conditions – is another important criterion for users. If the reference rate is not robust to difficult market conditions, there may be a risk of unwanted cash flow mismatches for banks as well as other market participants in periods when they already face difficulties.

There are a number of other properties that are desirable from a user's point of view. Reference rates should be produced based on clear rules, including transparent fallback procedures for periods of market stress; have a sufficiently high frequency of publication to allow the pricing of contracts on an ongoing basis; be readily available to facilitate contract verification; and be representative of a well-defined relevant market segment (see Table 1).

Reference rates based on unsecured interbank markets were for many years seen as timely and reliable proxies for bank funding costs, but also – given the perception of a small and stable common bank risk premium – as representative for instruments with very limited credit risk. It is only since the 2007–09 financial crisis that the robustness and representativeness of these rates have been challenged.

Desirable features of reference interest rates

Table 1

General feature	Definition	Important for
Reliability	Proper governance and administration to safeguard against manipulation or error	Market integrity and functioning
Robustness	Clear rules for reference rate production, including transparent and well-known fallbacks in periods of market stress	Availability and usability in times of market stress
Frequency	Rates calculated on a daily basis to facilitate market functioning	Pricing of new contracts, mark-to-market valuation
Ready availability	Published on dedicated sites	Verification of contracts
Representativeness	Rate drawn from a representative sample of the market in question	Correct pricing basis

### *2.3 Reference rate properties and applications: do they match?*

As with any type of standardisation, the use of reference interest rates comes at a cost. In particular, standardised contracts may not match users' risk management requirements as accurately as tailor-made contracts. The bigger the discrepancy between the risks included in a reference rate and those of the contract where it is used, the lower the net benefits arising from using a reference rate.

The optimal match between reference rates and underlying exposures will vary across users, depending on portfolio composition, funding approaches and business models. As such, the choice among properly governed and administered reference rates is best left to private sector participants. For instance, the cost of unsecured interbank term borrowing may still be the relevant measure of marginal funding costs for many banks. But for other market participants such as hedge funds, the marginal funding costs may be better represented by the cost of collateralised term funding or overnight interest rates. Although non-financial corporations might borrow in unsecured markets, their cost of funding might not move closely with unsecured interbank rates, and they too might prefer to use a reference rate with little or no bank credit risk, such as a collateralised or overnight rate.

Over the past few years, changes in the underlying markets and behaviour of key reference rates, on the one hand, and changing needs of reference rate users, on the other, may have added to discrepancies between the risks reflected in commonly used reference rates and users' needs.

Commonly used reference rates (such as Libor and Euribor) were originally designed to contain the common bank credit risk premium of "prime banks". The **increased dispersion of individual bank credit risk** since 2007, however, has undermined the network economies of reference rates capturing common bank risk, even for users seeking a reference rate with exposure to credit risk. Market participants, banks in particular, may not want to link the interest rate paid on outstanding loans and other financial contracts to interest rates that are no longer closely correlated to their individual cost of funding.

In addition, the range of users and funding models has widened over time to include those seeking a proxy for a credit risk free rate. This was not an issue when common bank risk premia were low and stable. In such an environment, the same reference rate could easily be used for different purposes, ranging from pricing syndicated loans to serving as the underlying in interest rate swaps or pricing other derivatives.

Three related trends in the global financial system may over the medium term create a case for greater diversity in the use of reference rates, and in particular a greater role for reference rates that include limited or no credit risk.

- First, **unsecured interbank market activity has declined noticeably** since 2007 especially in the United States and Europe, raising questions about the representativeness of reference rates based on this market. Liquidity in interbank markets is now typically confined to shorter tenors. Some of this decline may be cyclical, reflecting counterparty risk concerns because of financial fragility and weak global economic conditions, or in some cases also monetary easing and the increased provision of central bank reserves. It may also reflect new capital and liquidity regulations that aim at containing the excessive build-up of maturity transformation in the banking sector, much of which occurred through wholesale unsecured funding.
- Second, correspondingly, **banks have increased their reliance on secured wholesale funding** due to regulatory and market efforts to reduce and more actively manage counterparty credit risk exposures.
- Third, **derivatives markets reform also increases the importance of funding with little or no credit risk**. The mandatory shift to central clearing of standardised OTC derivatives and a gradual move towards more comprehensive collateralisation of OTC derivatives positions by market participants places greater emphasis on overnight management of cash collateral. As a result, overnight interest rates and other types of reference rates with a small credit risk component better match the risk of such derivatives positions. This change in practice has been accompanied by an increased use of basis swaps between Libor and overnight rates as well as swaps directly referencing overnight rates.

## *2.4 Obstacles to a transition to other reference rates*

The dominance of reference rates based on unsecured interbank markets domestically and internationally reflects the fact that they have functioned well for private contracting for many years. However, the continued use of such reference rates does not necessarily indicate that market participants see no need for alternatives.

The Working Group's roundtable discussions indicate that market participants are starting to diversify their use of reference rates. In particular, they seem to have become more interested in using (near) credit risk free reference rates. Some market

participants, notably large investment banks and hedge funds, typically use a range of reference rates, including overnight interest rates (unsecured or secured), and they have also started discounting payments based on expected compounded overnight rates. Overnight rates are typically used as reference rates for OIS, although there are variations across jurisdictions (see Box 2).

Box 2

## Overnight rates and overnight index swaps (OIS)

Overnight rates and OIS rates are sometimes used synonymously. However, they are distinct concepts and it is worth clarifying this as follows:

Overnight rates are the interest rates at which money market participants borrow and lend at overnight maturities. For many currencies and jurisdictions, a daily average is produced based on a weighted average of these transactions, although there can be regional/currency differences regarding which transactions are covered.

Overnight reference rates can be either secured or unsecured rates, or even a combination. However, currently the more commonly used ones are unsecured rates (eg Fed Funds Effective, EONIA, SONIA, Uncollateralized Overnight Call Rate). In practice, unsecured overnight rates can be seen as near-credit risk free because of their short maturity.

OIS are a particular form of interest rate swap, whereby, for the life of the contract, parties agree to swap a floating interest rate – based on compounded overnight interest rates (eg EONIA, SONIA, Uncollateralised Overnight Call Rate) – for a fixed interest rate (ie the OIS rate).

Unlike the floating rate, which is based on an overnight reference rate, there are at present few common reference rates based on the fixed leg OIS rate, which could for example be used for the pricing of the one- or three- month interest rate leg in loans or derivatives contracts. There are euro reference rates derived from OIS markets, but many jurisdictions do not have such reference rates.

In theory, OIS reference rates could be produced, whether from dealer quotes or traded rates, although liquidity in some OIS markets may be limited. Trade repository data do, however, indicate that for several of the major currencies there is substantial activity in parts of the OIS market (Annex 3). But, according to market participants, the use of term OIS rates as reference rates is not yet common.

Market frictions, coordination failures and other imperfections may, however, prevent users from shifting to new reference rates more rapidly. The Working Group's discussions with market participants points to impediments in four main areas:

- First, there may be obstacles to the development of **new reference rates**. The public good character of reference rates may prevent private sector participants from readily developing new, widely accepted reference rates, for instance by agreeing on reference rate criteria.
- Second, there may be impediments to the adoption of **existing alternative reference** rates compared to more dominant reference rates (ie network externalities). Higher transaction costs associated with alternative reference rates are an obvious disincentive to change. Any widespread change to another reference rate is also a large-scale coordination challenge.
- Third, even if viable alternatives are available, **user-related obstacles** may prevent a faster or smoother transition. One obvious obstacle is the large stock of legacy contracts. For

many users, transiting to alternative reference rates would require costly changes in internal accounting and risk management systems. Concerns about the operational risks associated with such changes may add to inertia.

- Fourth, **accounting rules**, including those for hedging, give preferential treatment to specific reference rates.<sup>3</sup>

### 3. Reference interest rates, monetary policy and financial stability

#### 3.1 General economic effects of the use of reference interest rates

The characteristics of reference rates used in the loan market are an important influence on risk sharing between lenders and borrowers. The use of reference rates based on unsecured interbank markets exposes the borrower to interest rate movements resulting from changes in the risk free rate and the common bank risk component. At the same time, the lender obtains a (partial) hedge against changes in its own funding costs.

This transfer of risk, and the terms on which it takes place, may affect the provision and allocation of credit. For instance, if banks are able to pass on funding cost risk to borrowers, this may increase bank credit supply. At the same time, if borrowers have to pay rates which reflect bank funding cost risk, borrowing may decline. The magnitude and direction of such effects depend on a number of factors, including the ability of end users to protect themselves against volatility in loan rates, and the ability of banks to cope with funding cost risk.

Moreover, the use of reference rates increases the significance of these rates for financing conditions in an economy. Depending on the specifics of the financial contracts, changes in the reference rate are then transmitted more or less directly to other segments of the financial system and the economy.<sup>4</sup> It may, however, also introduce frictions if markets are subject to different types of risks and shocks (eg, stress in bank funding markets may affect the funding costs of corporate borrowers that issue bonds referencing interest rates based on unsecured interbank markets irrespective of conditions in corporate bond markets).

<sup>3</sup> For example, in the United States, the FASB accounting standards currently give preferential treatment to interest rates on direct Treasury obligations and the Libor swap rates. The Fed Funds Rate, the Prime Rate, the FNMA Par Mortgage Rate and the SIFMA Municipal Swap Index cannot be used (Accounting Standards Codification 815-20-25-6A) without so-called effectiveness testing. Libor was included as a practical accommodation to simplify financial reporting. The decision was based on its prevalence as reference rate in interest rate hedging instruments, its historical position in the financial markets, and its role as a liquid, stable and reliable indicator of interest rates.

<sup>4</sup> When reference rates contain more noise and are volatile, fluctuations of financial and economic activity can increase significantly (see Kawata et al (2012), Sudo (2012) and Muto (2012)).

### *3.2 Implications for monetary policy transmission*

The use of reference interest rates hardwires financing conditions in the broader financial sector and in the economy with those in the markets where reference rates are set. Reference rates are therefore an important part of the interest rate channel in monetary policy transmission.

The transmission of monetary policy will depend on the link between key reference rate(s) in a jurisdiction and the central bank's key policy rate and operational target. This link is arguably closest in the case of overnight rates, which many central banks use as operational targets and which are in turn referenced in financial contracts. A somewhat special case is the Swiss National Bank, which has an operational target based on three-month CHF Libor because of its role as key reference rate in the Swiss economy.

The use of reference rates may pose complications to monetary policy transmission for three reasons. First, in periods of market stress, reference rates **may behave in unexpected ways**. In crisis periods, which tend to be associated with rising risk premia and market illiquidity, the liquidity risk and credit risk components embedded in reference rates tend to rise and be very volatile. This implies that changes in policy rates do not necessarily affect key reference rates in the same way they would in normal times. Indeed, as Graph 1 shows, policy interest rates and key reference rates, especially those including a common bank risk premium, drifted apart in 2007–08, and have diverged temporarily on several occasions since.

Second, if reference rates are not used properly, **economy-wide financing conditions may change in unpredictable and unintended ways**. For instance, an increase in the common bank risk component of reference rates could translate into a tightening of credit conditions well beyond interbank lending if such reference rates were used on a large scale for the pricing of corporate bonds, household mortgages or consumer loans.

Third, **cross-border factors** may distort the relationship between monetary policy and the key reference rate(s) used in the domestic economy. One example, albeit a more temporary one, is time zone differences. The fixing for an internationally used reference rate, such as Libor, may reflect market conditions at a particular point in time in that market, but it may not be indicative of market conditions in another market where trading takes place later in the day. For the central bank in this time zone, the reference rate will be a given for that day, potentially delaying and limiting the impact of policy action.<sup>5</sup>

Cross-border effects may also result from using FX-implied interest rates as reference rates, as a number of emerging markets do. A central bank that targets a short-term domestic money market interest rate would have only indirect influence over the FX-implied reference rate. The challenges are potentially compounded in times of unusual volatility in the FX market and/or in the foreign currency reference rate used to compute the FX-implied rate. Even in economies that have already introduced domestic (not FX-implied) reference rates, underdevelopment of their domestic money markets (eg decent liquidity only in a limited range of tenors) can

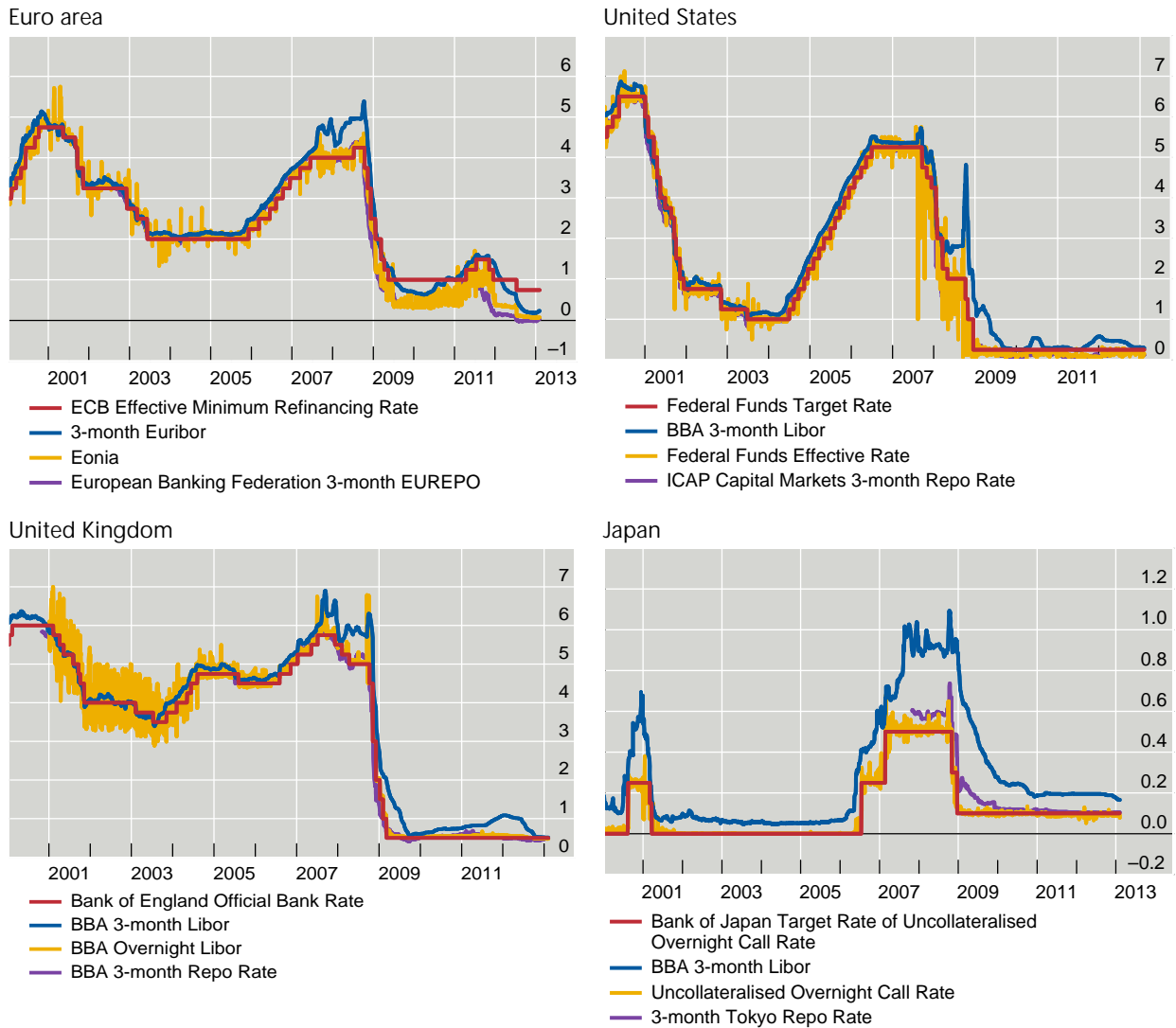
<sup>5</sup> For a discussion of the impact of time zone difference on funding markets during the financial crisis, see the report by the Committee on the Global Financial System and Markets Committee (2010), "The functioning and resilience of cross-border funding markets".

still pose challenges to monetary policy implementation. This helps explain ongoing efforts in many emerging markets to further develop domestic money markets.

## Policy rates and selected short-term interest rates

In per cent

Graph 1



Source: Bloomberg.

### 3.3 Financial stability aspects

The use of reference interest rates can also have implications for financial stability.

First, if reference rates are inadequately managed, there is the possibility that a **loss of confidence** in a widely used reference rate could lead parties to stop transacting in instruments that reference it. The resulting financial market disruptions could have wide-ranging implications for financial stability.

A second issue concerns the possible financial stability implications of a **transfer of bank funding cost risk to borrowers**. There are some good reasons to want banks to be able to pass on the common bank component of their funding cost risk when making loans and thus remove it from the (leveraged) banking



sector. A transfer of common bank funding risks to entities that are better able to bear and manage these risks would tend to enhance stability while facilitating the supply of floating rate-type financial instruments. It is, however, an empirical question to what extent such a transfer actually enhances the system-wide allocation of risks. Also, there is a trade-off between the ability of the banking system to offload risk and its capacity to perform financial intermediation at the macro level.

Third, financial stability concerns can emerge when the use of reference rates spreads **mispricing** in one market to other parts of the financial system. For instance, interbank market participants may underestimate banking sector risks. The resulting underpricing of common bank risk could facilitate the build-up of financial risks, especially if a reference rate is widely used. That the common bank credit risk premium was near zero until 2007 in major currencies arguably encouraged greater reliance on unsecured wholesale market funding. During the crisis, the sharp increase in reference rates because of rising liquidity and/or credit risk premia may have deepened funding problems.

Fourth, divergence of the underlying risk exposures and reference rates may create considerable additional **basis risk**. Valuation problems may arise if a bank uses a pricing model based on an unsecured interbank market reference rate to discount interest swaps that are centrally cleared and hence fully collateralised. In both cases, the mismatch between what the transaction requires and what the reference rate reflects is like an imperfect hedge; basis risk increases as a result. In the interest rates derivatives markets, many users are interested in managing the risk of movements in credit risk free rates, or taking a position on policy rates. For those purposes, a reference rate using (near) credit risk free rates would reduce basis risk.

Finally, in addition to increasing financial stability risks, these developments can also **impair the central bank's ability to respond to financial fragilities** in an effective manner. For instance, assessing general money market conditions and the sources of tensions in interbank markets becomes more difficult if reference rates become highly volatile due to idiosyncratic factors.

## 4. Towards better reference rate practices

Given the public-good nature of reference rates, it seems entirely appropriate that the official sector should play a role in ensuring reliability and robustness of reference rates and facilitating a range of private sector solutions. Two broad issues are particularly relevant when considering measures to support improvements in reference rate use and practices from a monetary policy transmission and financial stability perspective.

A first issue is how to ensure that the reference rate infrastructure generates rates that are appropriate to perform their functions. There are a number of identifiable, desirable characteristics in the administration and governance of reference rates that should generally be applied. While the choice of which rates to use is ultimately up to the private sector, there appears to be a role for the public sector in ensuring that such a framework for the governance and operations of reference rates is in place. If existing reference rates are unsatisfactory in this regard,

then central banks may need to work with the private sector in the effort to create sufficiently reliable and robust reference rates.

A second issue is how to facilitate market choices in a changing financial system. How can one ensure that market participants make sound reference rate choices from a risk-sharing perspective? This is particularly relevant in an environment with lower interbank market activity and greater heterogeneity of bank credit risk. Reference rates first and foremost facilitate private financial contracting. As such, the private sector ought to have a clear self-interest in ensuring sound practices in the use as well as the production of reference rates. And, in choosing among well-governed and administered reference rates, it is ultimately the private sector that will decide on what uses they are suited for. However, market participants tend to focus on the private benefits and costs of a reference rate, and this could potentially underestimate broader social benefits, preventing a collectively beneficial shift towards better governance or towards reference rates that better fit users' needs. The public sector can facilitate and encourage appropriate private sector choices by helping to remove obstacles, to correct market failures and to facilitate appropriate choices of reference rates, where needed. Public authorities in general, and central banks in particular, have a stake because of the implications for monetary policy and financial stability.

#### *4.1 Enhancing the reliability and robustness of reference rates*

##### *Possible improvements*

As discussed above, reliability and robustness are key features of good reference rates. A number of initiatives are reviewing how the governance and administration of existing reference rates can be improved, including IOSCO, the EU Commission, EBA/ESMA and the Wheatley Review of Libor. Measures that can instil more discipline in the rate setting process include (i) incorporating more information on actual transactions, (ii) strengthening governance of the rate setting process and (iii) improving transparency by making transaction volumes and prices publicly available. Managing the transparency of the rate setting process can also help to deal with stigma, which may have adverse financial stability implications: during periods of market stress, the publication of individual banks' contributions to reference rates can add to bank funding strains. Various options for dealing with this issue could be considered, including publishing individual contributions with a lag.

A number of reference interest rates do not have well-structured fallback solutions in the event of severe or protracted turmoil in the underlying market. Similarly, current fallback solutions do not address the structural challenges arising from the decline in unsecured interbank activity.<sup>6</sup> To enhance the robustness of reference rates, the private sector should take a more active role in developing clear, pre-agreed fallback procedures that address how to continue to determine and publish these rates in case of sharp falls in market liquidity or market disruptions. Also, financial contracts may need specific provisions to deal with situations where reference rates are not available for prolonged periods.

<sup>6</sup> However, most existing reference rate setting processes already have in place some form of business continuity procedures to safeguard against operational risks such as IT glitches, survey contributors failing to submit on time and other operational risks.

The specific rates used in such a fallback hierarchy should be closely aligned with the risk components included in the original reference rate. This may require different specifications depending on the uses of a reference rate. An issue that requires further consideration is how to put in place an ultimate backstop in the absence of any reasonable market proxy. A second issue is how to construct a system when market participants do not prefer one place in the hierarchy to another, which could generate an incentive to manipulate.

Depending on the market from which the reference rate is derived, a process of producing reference rates with a fallback procedure could comprise two stages: (i) under normal market conditions, rely to the extent possible on effective transactions in the market defining the reference rate; (ii) failing that, submissions should include taking into account proxies such as actual (own) transactions in similar or related markets.<sup>7</sup> Expert judgment is likely to play a greater role in the second stage.<sup>8</sup> Measures to improve the management of the subjectivity in rate setting processes, similar to those proposed in the Wheatley Review, may allow greater scope for the inclusion of expert judgment in a reliable manner in the rate setting process. Measures to make reference rates more reliable can also enhance resilience more generally by increasing confidence in the rate.

More generally, the robustness of reference rates depends on major market participants assuming their responsibility for contributing to the setting of reference rates. The relevant industry groups should consider reminding their members of the advantages of having representative panels for widely used reference rates. If representativeness cannot be achieved on a voluntary basis, mechanisms for making submissions mandatory might have to be considered.

### *The role of the public sector*

As can be seen from reports already published by authorities in a number of countries, it is clear that the official sector, and regulators in particular, have a role in enhancing the reliability and robustness of reference rates. Working with domestic and international regulatory bodies, central banks should influence the ongoing reform processes to ensure that reference rates are backed up by sufficiently strong governance and administration.

Central banks are not directly responsible for reference rate processes in many jurisdictions. Nevertheless, as reliable reference rates with well-designed fallback arrangements reduce the risk of market disruptions, central banks and the public sector more generally have a clear financial stability interest in engaging with the private sector and other public authorities on deliberations concerning reference rate setting procedures. Central banks should work cooperatively with relevant domestic regulators and authorities to strengthen governance and to develop guidance to encourage market participants to use reference rates that are reliable and robust. They should also work cooperatively with relevant authorities to effectively monitor rate submission processes. Central banks could also play a role in enhancing transparency by improving financial market statistics closely related to reference rate production.

<sup>7</sup> See the US Commodity Futures Trading Commission (2012) enforcement order against Barclays and Box 4.B in "The Wheatley Review of LIBOR: final report".

<sup>8</sup> Since liquidity and other premia can jump in illiquid markets, appropriate use of expert judgment is likely to become necessary (see Kobayashi (2012)).

## Central bank involvement in reference rate setting and oversight

The role of central banks in reference rate processes varies considerably across jurisdictions and currency areas, reflecting different institutional arrangements and differences in the way money markets have developed. This box, which draws on contributions received from central banks, gives some examples.

Reference rates have typically developed through private initiative, and there are many examples where central banks do not play any specific role in rate setting or oversight (eg Libor, Euribor).

However, more recently, several central banks (eg South African Reserve Bank, Hong Kong Monetary Authority, Sveriges Riksbank) have been formally involved in reviews of rate setting processes, namely for reference rates based on the unsecured interbank market.

Central banks often play a role in producing overnight interest rates, which are in many cases operational targets of monetary policy. The Federal Reserve and the Bank of Japan publish the Federal Funds Effective Rate and Uncollateralized Overnight Call Rate respectively. Both rates are volume-weighted averages of overnight transactions conducted through brokers. The ECB functions purely as the calculation agent for the Euro Overnight Index Average (EONIA) and the Bank of Canada provides a similar function as an independent third party for the Canadian Overnight Repo Rate Average (CORRA). In the two latter cases, industry bodies are owners of the rates. In all of these cases, the central banks do not have any oversight function related to the reference rate process.

Central banks have also participated in the production of other reference rates to support market development. The Swiss National Bank developed the Swiss Reference Rate and related calculation methodology jointly with the Swiss Stock Exchange (SSE) to aid the development of repo markets. The SSE calculates and publishes the reference rates. Similarly, in response to industry requests to support the development of repo markets, the Bank of Japan started the production of the Tokyo Repo Rate in 2007, before handing over production to the Japan Securities Dealers Association in 2012.

A small number of central banks, including the Bank of Mexico, participate in transactions that determine reference rates. The production of the Equilibrium Interbank Interest Rate (TIIE), the main reference rate for interbank transactions, loans and derivatives involves the Bank of Mexico as counterparty between borrowers and lenders: each day, six banks randomly picked from the sample of participating banks are required to submit bids. The Bank of Mexico determines the TIIE (equilibrium rate) based on the banks' submissions, and depending on where their bids lie in relation to the TIIE, banks are required to either lend to or borrow from the Bank of Mexico on the terms of their bid.

Moreover, the public sector, including central banks, can help underpin fallback procedures by improving the availability of information on the pricing and activity in the markets from which reference rates are derived. By improving awareness of what "normal" market conditions look like, market participants will also be in better position to judge under what conditions the fallback solution is warranted. As in other areas, the actual form of possible central bank involvement depends on country-specific, or currency area-specific, circumstances, including market structures and institutional arrangements.

### *4.2 Facilitating reference rate choices*

#### *Possible improvements*

Reference rates derived from term unsecured interbank markets are suitable for some transactions, but not for all. Hence, there is a case for the private sector to move towards the use of, and develop, additional reference rates to suit different needs. Having a menu of different reference rates will allow market participants to

better meet their specific needs. However, the challenge is to build a critical mass in each reference rate to reap the positive network externalities.

The work carried out by the Working Group, including the consultations with the private sector, suggests that there is scope for facilitating the use of alternative reference rates over the medium term. In particular, the use of reference rates may have become too concentrated on rates based on unsecured interbank transactions, and having reference rates that are based on (near) credit risk free rates – and thus are less affected by swings in bank credit and other risks – could be an important complement to existing reference rates. Prime candidates are overnight interest rates (including OIS rates) and rates derived from GC repo markets. These may better serve market participants looking to manage interest rate risk exposures.

There are a number of reasons to use overnight interest rates as reference rates. First, the underlying markets are fairly active and overnight markets are arguably likely to remain relatively liquid, given their central role in the day-to-day management of banks' payments balances and because of their significance for monetary operations. Second, overnight rates are (near) credit risk free. Third, the existence of swap markets referencing the overnight rate is likely to support overnight market liquidity through arbitrage activity and also means that term interest rates are available for pricing purposes. In addition, OIS contracts, which are a form of interest rate swap, are likely to be cleared in the future through central counterparties (CCPs).

There may also be scope for the development of other unsecured reference rates. However, unlike OIS or GC repos, there are no immediately obvious choices. Existing solutions typically also suffer from a lack of activity in the underlying primary market (eg only limited issuance or indeed trading of bank bonds, certificate of deposits). Conceptually, one approach could be to build a hybrid rate using clearly identifiable credit risk and interest rate components – such as combining credit default swap (CDS) premia and a measure of risk free rates. But liquidity issues would persist in this example, and the tenor of generally the most liquid CDS contract is much longer (at five years) than the reference rates currently used. An alternative could be for the lending banks to shift to using a risk free rate plus a fixed spread agreed at the beginning of the loan, but this would leave the risk of changes in funding costs squarely with the bank.

### *The role of the public sector*

Reference rates are akin to public goods, produced by a few but freely usable by many. As such, private sector investment in the production of reference rates tends to be too low. For instance, perceiving only the private cost and not the broader social benefits, market participants may have little incentive to report transactions for reference rate computation or participate in panels. Increased coordination among market participants, potentially facilitated by the public sector, may also be needed to help solve the “chicken and egg problem” with new reference rates: market participants prefer rates that are widely and actively used, as this facilitates transactions. But, these network externalities are only realised if a reference rate becomes widely used.

The public sector can potentially compensate for such underinvestment and lack of coordination in the private sector by encouraging or prompting change. Central banks may play a distinct role in this process. They have a system-wide perspective and well-established communication channels with private market participants. Hence, central banks would be well-positioned to ensure that costs and

distortions potentially associated with a move towards alternative reference rates are kept to a minimum.

If central banks believe that there is a growing discrepancy between the economic rationale and the actual use of reference rates, or that there are market or regulatory impediments that prevent private sector participants from adopting economically appropriate alternatives in their jurisdictions, then they may wish to consider measures that could reduce those barriers and encourage transition. One situation in which such intervention would be clearly called for is if it were determined that the governance and administrative structures of existing reference rates were not capable of adapting to make them reliable. In that case, central banks would need both to work with private sector market participants and other authorities in developing new reference rates that could meet these criteria and to stand ready to help overcome potential barriers to their adoption.

There are a number of specific measures that public authorities, and central banks in particular, could potentially take to either encourage change or support transition to alternative reference rates.

**Encouraging change.** The authorities and, by extension, central banks have a range of tools open to them if they want to prompt change. At the least active end of the scale, they could encourage change via verbal comments (ie by “open mouth policy”). However, this may be insufficient to alter the current situation, which has withstood a credit crisis during which volumes in interbank transactions dried up and risk premia increased markedly.

Another possible area is the promotion of transparency. Increasing information on the liquidity of the specific segment or tenors of markets from which reference rates are derived will help indicate which rates are more likely to accurately reflect borrowing costs. The public sector could help promote the dissemination of information in several ways, for example by:

- ensuring greater availability of transaction volume and price data for the relevant markets;
- encouraging the development of mechanisms for the collection and dissemination of information on markets from which reference rates are derived, eg the creation of trade repositories; and
- providing public information about available reference rates and encouraging the sharing of knowledge/technology on how to use different types of reference rates for pricing financial instruments.

More concrete steps include, for example, central banks supporting the development of markets for (near) credit risk free rates, say by standardising the coverage and calculation of overnight rates and promoting related OIS and basis swap markets. In fact, public authorities also use interest rate swaps, which tend to use reference rates based on unsecured interbank markets, so they can move to using swaps referenced to overnight rates in an effort to encourage others to do so.<sup>9</sup>

<sup>9</sup> The temporary US dollar liquidity swap arrangements among major central banks use the OIS rate to fix interest payments.

**Supporting transition.** The consultations with the private sector also suggest that the public sector can play a role in helping the private sector to manage risks associated with reference rate transition. This includes collaboration with the private sector on transition issues, eg by encouraging trade bodies or the largest market participants to examine the issues collectively and then agree on some kind of shift or transition. Public sector involvement would be particularly worthwhile if the market failure the intervention was seeking to address was a coordination failure. Again, there are a range of possible levels of involvement by the authorities that might depend on country-specific, or currency area-specific, factors.

There is also scope for encouraging private sector cooperation and collaboration on legal matters, such as publishing legal opinions or, in the extreme case, requiring a shift from one reference rate to another by law. A special case in this context is the role of the public sector in connection with the transition to new reference rates when the euro was introduced (see Box 4).

Supporting private sector transition might also include modifying accounting standards to ensure that there is no excessive hardwiring of specific reference rates.

Central banks have a genuine interest in reference rates because of their policy and operational proximity to the markets from which reference rates are derived. Depending on the proximity, they can support efforts to improve reference rate practices. The actual form of involvement in such initiatives depends on country-specific, or currency area-specific, circumstances, including market structures and institutional arrangements. In fact, some central banks are involved in calculating or setting reference rates (see Box 3).

## Reference rate transition – experiences from the introduction of the euro

Although an exceptional case where transition was required by the introduction of a new currency, the introduction of the euro demonstrates how different countries handled the transition from reference rates in national currencies to euro area reference rates. This transition was governed by EU Council Regulations.<sup>①</sup> While not imposing a change in the specific interest rate referenced in financial contracts, these regulations forced a change in the denomination of the currency underlying existing reference rates. This changeover was implemented in accordance with the principle of the continuity of contracts and other legal instruments.<sup>②</sup>

The public sector played a key role in the transition. In 1998, the European Monetary Institute (EMI) and subsequently the ECB issued a large number of public opinions assessing the various national legal initiatives regulating the changeover process for the introduction of the euro and the transition from the old national reference rates. These opinions favoured the replacement of the old reference rates with a reference rate able to represent the whole euro area.<sup>③</sup> Most member states decided to replace their domestic unsecured interbank reference rates with Euribor/EONIA for both legacy contracts and new contracts starting 1 January 1999.

In **Italy**, national legislation specified the change in the reference rate for financial contracts from the Rome Interbank Offered Rate (Ribor) to Euribor. In **France**, the switch from the Paris Interbank Offered Rate (Pibor) to Euribor also required a change in national legislation. The legal framework confirmed the principle of continuity of interest rates and indices. An order from the Ministry of Finance replaced Pibor by Euribor. In **Germany**, the authorities decided that the Frankfurt Interbank Offered Rate (Fibor) would only be produced until 30 December 1998. From 1 January 1999 onwards, German banks instead contributed to the compilation of Euribor and EONIA.

Public regulation stipulated that EONIA replaced the overnight Fibor rate and Euribor the corresponding Fibor rates for one- to 12 month maturities. Spain permitted the continued use of the Madrid Interbank Offered Rate, Mibor, for legacy contracts. This continued use after the introduction of the euro, in parallel to that of Euribor, was regulated in the Spanish “Umbrella law” on the introduction of the euro.

The private sector also took important initiatives in order to ensure the continuity of outstanding interest rate derivatives contracts entered into before the introduction of the euro and Euribor. The International Swaps and Derivatives Association (ISDA), for example, sponsored a multilateral amendment mechanism, called the ISDA EMU protocol. The protocol modifies Master Agreements between participating parties collectively, eliminating the need to modify each Master Agreement individually. The price sources provision of the ISDA protocol lists a number of “fallback” options for obtaining price sources for cases when national currency reference rates disappear or change.

① Council Regulations 1103/97 and 974/98.

② Article 3 of the 1103/97 regulation therefore states that: “The introduction of the euro shall not have the effect of altering any term of a legal instrument or of discharging or excusing performance under any legal instrument, nor give a party the right unilaterally to alter or terminate such an instrument. This provision is subject to anything which parties may have agreed.”

③ See, for example, point 5 (c) of the Opinion of the EMI CON/98/11: [http://www.ecb.int/ecb/legal/pdf/en\\_con\\_98\\_11.pdf](http://www.ecb.int/ecb/legal/pdf/en_con_98_11.pdf).



## 5. Concluding remarks and recommendation

Good reference rate practices, including reliable and robust reference rates that embody sound governance procedures and the adequate use of such reference rates, bring substantial economic benefits. As discussed above, it is therefore essential that market participants use robust and reliable reference rates that are adequately governed and administered and free from market abuse, and are able to choose rates that are most consistent with their business needs.

In their responsibility for monetary policy and financial stability objectives, central banks have a genuine interest in the use of reference rates in a way that supports the efficient and stable functioning of the financial system and in reference rates which are robust even during times of stress.

Central banks should continue to support the development of well-functioning money markets, in line with their primary policy objectives. This includes close monitoring of developments and structural changes in the relevant markets, and constructive interaction with market participants on an ongoing basis.

While initiatives to improve reference rate practices should be led by the private sector, due to their public-good nature, private sector investment in the production of the reference rates tends to be low. Thus, central banks see two other areas where they can contribute. The actual form of involvement will depend on the extent of market failure and country-specific, respectively currency-area specific, circumstances, including market structure and institutional arrangements.

### ***(i) Enhancing the reliability and robustness of reference interest rates***

Resilient reference rates, especially during times of stress, will contribute to maintaining the proper functioning of the monetary transmission mechanism and the stability of the financial system. Recognising that much work has already been conducted or is underway in various forums, there are a range of actions central banks or other parts of the public sector should take in this area. They include:

- promoting better governance and oversight of rate setting processes and possible ways to deal with stigma issues surrounding the publication of individual quotes;
- promoting sound rate setting processes based on the enhanced use of transaction data combined with the transparent and appropriate use of expert judgment and, where appropriate, promoting the introduction of robust fallback procedures;
- continuing to work with market participants to improve the availability of information and statistics on the pricing and activity in underlying markets as well as related markets; and
- engaging in a dialogue with the private sector on how financial contracts can deal with situations where reference rates may become unavailable for prolonged periods.

### ***(ii) Enhancing reference rate choices***

Having the choice among a number of reliable reference rates would (i) enable market participants to select those which are most consistent with their needs, and

thus (ii) enhance the resilience of the financial system by better aligning reference rate uses.

The combination of strong network economics, coordination problems and transaction costs may hamper the transition to alternative reference rates that better fit users' business needs. There are a range of possible measures central banks could take to promote additional choices and to alleviate constraints to transition from verbal encouragement to more active involvement. They include:

- considering (where appropriate) whether there is a case for a more active role in guiding and facilitating a transition by, for example, working with market participants and other public authorities to review and possibly reduce possible practical, legal and accounting constraints to transition. Aiding the transition to new reference rates would be particularly crucial if central banks believe that there is a growing discrepancy between the economic rationale and the actual use of existing reference rates or if the quality of governance and administration of existing rates is unsatisfactory;
- facilitating informed reference rate choices by improving transparency of markets from which reference rates are derived, eg by encouraging the provision of information on market activity and other relevant data;
- where appropriate, promoting the development of (near) credit risk free policy-related reference rates such as overnight rates, OIS fixed rates and GC repo rates. Specifically, central banks could further assess what obstacles currently prevent greater use of such rates and encourage the private sector, where necessary, to take steps to standardise reference OIS rates and promote the development of related basis swap markets.

In certain cases, central banks or supervisory authorities could become more actively involved in producing reference rates. The decisions to do so would depend on the mandate of the individual central bank and the evolution of money markets in each jurisdiction.

## References

- Angelini, P, A Nobili and M C Picillo (2009): "The interbank market after August 2007: what has changed and why?", *Working Paper* no 731, Bank of Italy.
- Committee on the Global Financial System and Markets Committee (2010): "The functioning and resilience of cross-border funding markets", *CGFS Papers*, no 37, March
- Gefang, D, S Potter and G Koop (2011): "Understanding liquidity and credit risks in the financial crisis", *Journal of Empirical Finance*, vol 18, pp 903–14.
- Kawata, H, T Kitamura, K Nakamura, Y Teranishi and S Tsuchiya (2012): "Effects of the loss and correction of a reference rate on Japan's economy and financial system: analysis using the financial macro-econometric model", Working Paper no 12-E-11, *Bank of Japan Working Paper Series*, December.
- Kobayashi, S (2012): "Application of a search model to appropriate designing of reference rates: actual transactions and expert judgment", Working Paper no12-E-13, *Bank of Japan Working Paper Series*, December.
- Muto, I (2012): "A simple interest rate model with unobserved components: the role of the interbank reference rate", Working Paper no 12-E-10, *Bank of Japan Working Paper Series*, December.
- Nobili, S (2012): "Liquidity risk in money market spreads", preliminary paper, Bank of Italy.
- Sudo, N (2012): "Financial markets, monetary policy and reference rates – assessments in DSGE framework", Working Paper no 12-E-12, *Bank of Japan Working Paper Series*, December.
- UK Treasury (2012): "The Wheatley Review of LIBOR: final report", available at [http://cdn.hm-treasury.gov.uk/wheatley\\_review\\_libor\\_finalreport\\_280912.pdf](http://cdn.hm-treasury.gov.uk/wheatley_review_libor_finalreport_280912.pdf).
- US Commodity Futures Trading Commission (2012): Enforcement order against Barclays PLC, Barclays Bank PLC and Barclays Capital Inc, available at <http://www.cftc.gov/ucm/groups/public/@lrenforcementactions/documents/legalpleading/enfbarclaysorder062712.pdf>.

## Annex 1

# ECC Working Group on financial market reference rates

## Terms of Reference

### Background and objective

At its September 2012 meeting, the Economic Consultative Committee (ECC) agreed to set up a group of senior officials to discuss the use of reference rates in financial markets. The Working Group will be chaired by Hiroshi Nakaso (Assistant Governor, Bank of Japan), Chairman of the Markets Committee, and includes experts and senior officials from 13 central banks.

The Group aims to analyse and clarify the role of reference interest rates from a central bank perspective, including the implications of reference rate choice, design and use for financial stability and the conduct of monetary policy. Based on this work, and with a view to aiding market choices, the Group will develop views on what features reliable reference rates should have and formulate recommendations for how reference rates could be made more robust under various states of financial markets, including times of stress. The Group will not consider issues related to market abuse, which are being discussed separately by regulatory bodies.

The main objective is to provide central bank input into the wider official sector debate coordinated by the Financial Stability Board.

### Key issues for central banks

Three broad issues the report should seek to cover are (i) financial market use of reference interest rates; (ii) reference interest rates during periods of market stress; and (iii) transition to new reference interest rates. Possible questions for the three areas include:

- i. Financial market use of reference interest rates*
  - Why and how are reference rates used for pricing and risk management in different markets and by different types of market participants?
  - To what extent does the use of different reference rates affect market functioning and the behaviour of financial institutions?
  - How resilient are contracting practices surrounding reference rates?
- ii. Reference interest rates during periods of market stress*
  - What constitutes a “robust” reference rate, especially in times of market stress? How inactive are markets from which reference rate quotes/prices are drawn during periods of market stress?

- How can one ensure reference rates are reliable even if markets are illiquid?
- What are the necessary elements from a central bank perspective for reference interest rates in terms of (i) financial stability and (ii) the effective transmission of monetary policy?

*iii. Transition to new reference interest rates*

- In what circumstances is a transition to new reference rates considered to be necessary and/or desirable?
- Should central banks play a more active role in relation to reference rates?
- What can we learn from the experiences of central banks that have been involved in determining reference rates?

## **Process**

A first part of the process will focus on establishing an empirical and analytical basis. This will include (i) a review of relevant existing research by central banks and others; and (ii) central banks' country studies on the use of reference rates in their jurisdictions and their experiences with such rates during normal times and the recent crisis.

Another part will involve interaction with the private sector. The main objective is to understand how reference rates are used and what this entails for the functioning of markets and the financial system. As part of this work, a series of regional meetings with industry representatives and a broader set of central banks will be organised.

This fact-finding will underpin analytical work to enhance central bank understanding of, among others, which design elements in reference rate setting frameworks are critical to help ensure the soundness of rate setting during periods of underlying market stress, and which elements may need to vary according to the market in which the reference rate is being used. This would help guide the Group in developing recommendations for the design of robust reference rate setting frameworks.

The Group will report back to Governors in January 2013.

## Annex 2

### Summary of roundtable discussions between central banks and market participants

The Working Group held a series of roundtable meetings with the private sector in Europe, the Americas and Asia.<sup>10</sup> The meetings were attended by banks (as both producers and users of reference rates), and by other institutions, including end users (eg corporates, insurance companies, asset management firms), brokers and service providers. Central bankers from the region, including from central banks which are not members of the Working Group, participated in the meetings.

The discussions covered a range of issues, such as how reference rates are used by market participants, market participants' views on the concept of reference rates, the rate setting process, potential obstacles to the adoption of new reference rates, and the potential role for central banks and the official sector in relation to reference rates. Interactions at the meetings were active and constructive, providing a valuable basis for preparing this report.

Highlights of the meetings are provided below.

#### ***Recent market developments***

At all three meetings, market participants noted that, due to the global financial crisis and the ensuing low interest rate environment brought about by the aggressive monetary easing of central banks in advanced economies, unsecured interbank market activity had declined, especially in tenors beyond three months. Activity in the secured market had increased in some markets. It was felt by many that such conditions of constrained market activity were likely to persist, due also in part to the new regulatory environment.

#### ***Use of reference rates***

Reference rates are used for a wide range of financial activity, most commonly to price loans and derivative products. They are also used as a discount factor and some major firms and end users noted their use for internal risk management and performance assessment purposes.

Libor is the most widely used reference rate globally, and a number of banks and users at the meetings in London and New York emphasised that, through its wide use and long history, Libor was deeply embedded in their internal systems. At the same time, many jurisdictions have their own unique reference rates which are actively used in domestic markets. In many countries, overnight rates where the market is most liquid are often used as reference rates. In emerging market economies where foreign banks are often major players in interbank markets, FX-implied reference rates are also used. It was also gradually becoming more common for market participants to use different reference rates for different purposes. For

<sup>10</sup> In London (6 November 2012), New York (8 November 2012) and Singapore (19 November 2012) respectively.

example, when pricing loans, reference rates which reflect bank funding costs would be appropriate, while major financial institutions active in derivatives markets were shifting toward the use of (near) risk free reference rates (eg fixed OIS rates) when calibrating the net present values of their derivatives portfolios. The reasons given for the shift, reflecting the experience from the global financial crisis, were (i) the difficulties in using survey-based reference rates which include bank credit risks; (ii) the shift towards collateralised transactions; and (iii) the shift of OTC derivative transactions to central clearing.

The positive externalities of a reference rate that functions as a “common language” or common reference point enabling market participants to readily take on or transfer risks across products and currencies were frequently mentioned. It was explained that currently Libor is the most useful in this regard due to its wide use and liquidity (ie ability to readily trade). Users globally emphasised the importance of reliability (ie availability of data even in times of stress), transparency (ie clear process for producing rates) and liquidity (ie deep underlying markets).

### ***Concept of reference rates***

The Working Group presented the possibility of decomposing reference rates into a core credit risk free (or risk neutral) component and a bank credit risk component (which could possibly be further split into a system-wide bank credit risk factor and an individual bank credit risk factor). Market participants were generally comfortable with this breakdown, but also commented that a liquidity risk component was clearly important especially in times of market stress at the short end and that it would often be quite difficult to distinguish the individual credit and liquidity risk components separately, especially on a real-time basis.

### ***Rate setting process***

There was a general consensus among market practitioners that, whenever and to the extent possible, reference rates should be transaction-based. However, the financial crisis has shown that market liquidity can dry up in times of stress, which argues for retention of elements of expert judgment. There was often a fairly mechanical process to deal with situations such as system failure where a reference rate could not be provided (eg using the previous day's rate, asking for quotes from a specific number of reference banks), but it was acknowledged that this would only be feasible for a very short period and not suited for periods of general market stress. Market participants acknowledged the need to improve the process for dealing with stress periods.

In order to maintain the credibility of the reference rate, market practitioners emphasised the importance of having a strong governance framework and a transparent rate setting process. In dealing with situations where liquidity in underlying markets becomes limited, many agreed about the benefits of having a standard process for using information from transaction data in related markets to guide the use of expert judgment in producing individual submissions. More specifically, when the contributing institution is not transacting in the underlying market, it would take into consideration its activity in similar markets, and when that is also limited will look at third-party activity in such markets (a so-called waterfall approach or hierarchy). Some suggested that, within a framework of strong public sector oversight or supervision, the reporting banks could be provided with anonymity in providing rates, or individual submissions could be published with a lag (eg three months). Such a framework could remove or reduce stigma issues.

### ***Possible transition to other reference rates***

Especially at the meetings in London and New York, market participants emphasised the dominant role played by Libor. Constraints they mentioned on shifting towards other reference rates included (i) limited liquidity in other reference rates; (ii) large operational costs for moving to alternative reference rates; (iii) the long history of using Libor and the comfort this provided (ie inertia); (iv) possible legal risks that could emerge in switching to alternative reference rates; and (v) accounting rules in the United States (it was explained that under US GAAP only Libor and US Treasury rates would be considered as rates eligible for the recognition of hedge accounting). However, as stated above, major financial institutions were gradually switching to (near) risk free rates in pricing and discounting their derivatives positions, since this better reflected the underlying risks.

### ***Possible role for the public sector including central banks***

There were a range of views with regard to the role of the public sector. In general, it was noted that the use of reference rates was driven by market forces and in principle should be left to the decision of market participants. There was clear resistance to having the public sector dictate the use of a specific reference rate. At the same time, reflecting on the recent problems regarding the submission of Libor quotes, some commented that the supervisory and/or regulatory role of the public sector could enhance market confidence in reference rates. There were also suggestions that the public sector could play a role in reducing some of the constraints listed above with regard to expanding the possibilities of transiting to alternative reference rates (eg facilitating the standardisation process of alternative reference rates, working with industry bodies to reduce legal risks surrounding transition).



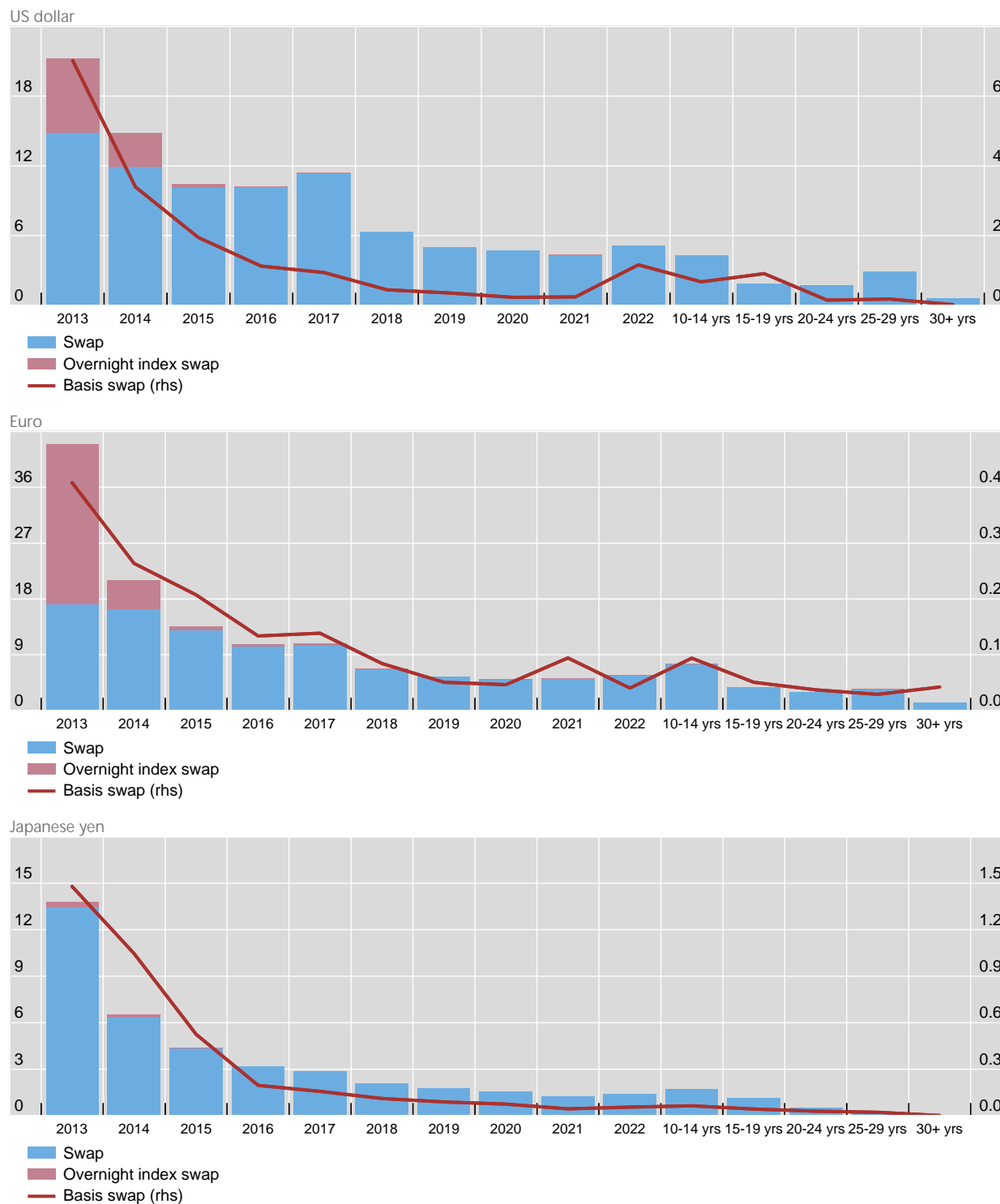
## Annex 3

### Swap market activity

#### Maturity distribution of interest rate derivatives<sup>1</sup>

Volume, in trillions of US dollars

Graph A1



<sup>1</sup> As of 1 February 2013.

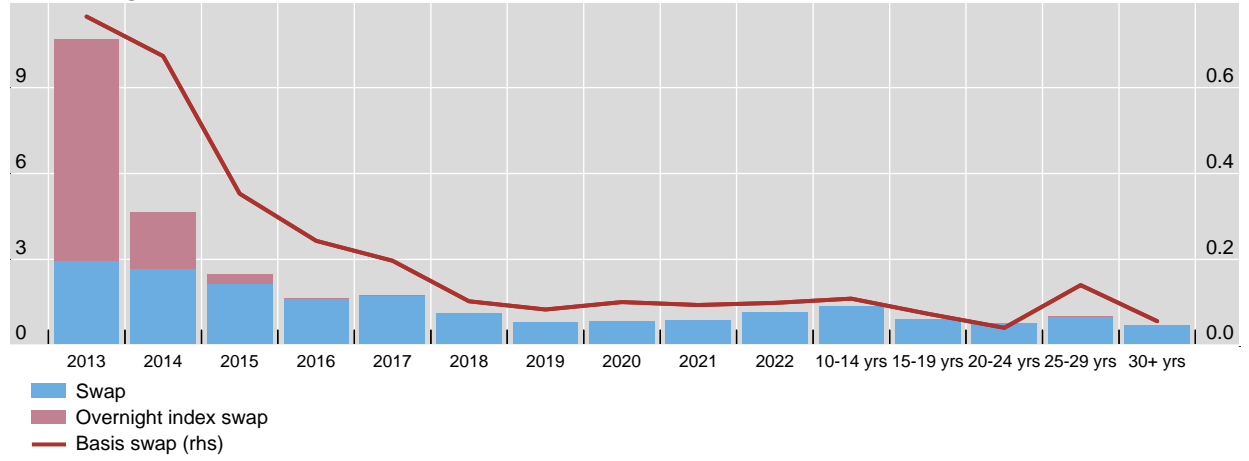
Source: DTCC.

# Maturity distribution of interest rate derivatives<sup>1</sup>

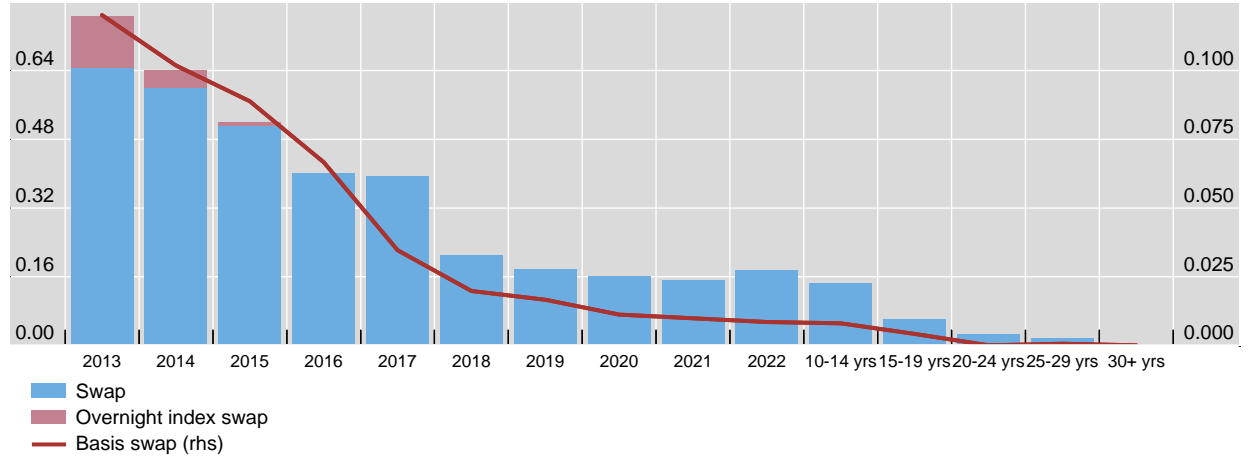
Volume, in trillions of US dollars

Graph A2

Pound sterling



Swiss franc



<sup>1</sup> As of 1 February 2013.

Source: DTCC.

## **Annex 4**

### Members of the Working Group

Chair	<b>Hiroshi Nakaso</b> (Bank of Japan)
Bank of Canada	<b>Paul Chilcott</b>
Bank of France	<b>Alexandre Gautier</b>
Deutsche Bundesbank	<b>Andreas Dombret</b>
	<b>Kai Tänzler</b>
European Central Bank	<b>Roberto Schiavi</b>
Hong Kong Monetary Authority	<b>Henry Cheng</b>
Bank of Italy	<b>Emerico Zautzik</b>
Bank of Japan	<b>Hiromi Yamaoka</b>
Bank of Mexico	<b>Julio Santaella</b>
Monetary Authority of Singapore	<b>Bernard Wee</b>
Swiss National Bank	<b>Dewet Moser</b>
Bank of England	<b>Paul Fisher</b>
	<b>Andrew Hauser</b>
	<b>Ben Wensley</b>
Federal Reserve Bank of New York	<b>Simon Potter</b>
	<b>Kevin Stiroh</b>
Federal Reserve Board	<b>David Bowman</b>
Secretariat	<b>Dietrich Domanski</b>
	<b>Jacob Gyntelberg</b>
	<b>Corrinne Ho</b>
	<b>Yoshinori Nakata</b> (Bank of Japan)

## Annex 5

### Central banks providing input to the Working Group process

**Reserve Bank of Australia**

**National Bank of Belgium**

**Central Bank of Brazil**

**National Bank of Denmark**

**Reserve Bank of India**

**Bank Indonesia**

**Bank of Korea**

**Central Bank of Malaysia**

**Central Reserve Bank of Peru**

**National Bank of Poland**

**Central Bank of the Russian Federation**

**South African Reserve Bank**

**Bank of Spain**

**Sveriges Riksbank**

**Bank of Thailand**

**Central Bank of the Republic of Turkey**