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The Conduct of Monetary  
Policy in the Future:  
Instrument Use

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**By Kei-Ichiro Inaba, Rory O'Farrell, Łukasz Rawdanowicz and Ane Kathrine Christensen**

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## ABSTRACT/RÉSUMÉ

### The Conduct of Monetary Policy in the Future: Instrument Use

The set of monetary policy instruments has expanded since the start of the global financial crisis in the many OECD economies. Against this background, this paper analyses whether some of the new instruments should be retained in the long term when broader financial stability objectives are likely to feature more prominently as monetary policy goals than prior to the crisis. It also assesses if these new instruments should be used during the transition to this situation and when countries are stuck in persistent stagnation. In the post recovery situation, central banks could ultimately revert to targeting short-term market rates with small balance sheets. This might, however, require changes to monetary policy implementation due to new liquidity requirements. The transition to this situation will be lengthy and will require a mixture of liquidity draining instruments. Alternatively, they could adopt a floor system, which may benefit financial stability. The use of unconventional measures as a substitute for policy rate cuts will no longer be needed unless countries remain in persistent stagnation. Nevertheless, in the post-recovery normal, extended collateral and counterparty eligibility could be sustained, and currency swap lines among central banks could be expanded.

*JEL classification codes:* E42, E43, E52, E53, F33.

*Keywords:* conventional and unconventional monetary policy, corridor and floor interest rate systems, liquidity, quantitative easing, forward guidance.

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### La conduite de la politique monétaire à l'avenir : L'utilisation d'instruments

Dans de nombreux pays de l'OCDE, la palette des instruments de la politique monétaire s'est élargie depuis le début de la crise financière mondiale. Dans ce contexte, on s'efforce dans le présent document d'analyser s'il conviendrait de conserver certains de ces nouveaux instruments dans la durée, lorsque les objectifs de stabilité financière au sens large s'affirmeront probablement davantage en tant qu'objectifs de la politique monétaires qu'avant la crise. Il s'agit également d'évaluer si ces nouveaux instruments doivent être utilisés pendant la période de transition, et lorsque les pays sont enlisés dans une stagnation persistante. Après la reprise, les banques centrales pourraient revenir au ciblage des taux de marché à court terme avec des bilans d'ampleur modeste. Ceci pourrait toutefois obliger à modifier la mise en œuvre de la politique monétaire, du fait des nouvelles exigences en matière de liquidité. La phase de transition vers une telle situation sera longue et nécessitera une panoplie d'instruments permettant de drainer des liquidités. Autrement, les banques centrales pourraient adopter un système de plancher, qui pourrait être bénéfique à la stabilité financière. Le recours à des mesures non conventionnelles pour suppléer des baisses des taux directeurs ne sera plus nécessaire, sauf si les pays se retrouvent dans une situation de stagnation persistante. Néanmoins, dans une situation normale d'après reprise, une extension des conditions d'admissibilité des garanties et des contreparties pourrait être maintenue, et les lignes de crédit réciproques entre banques centrales pourraient être élargies.

*Codes JEL :* E42 , E43 , E52 , E53 , F33.

*Mots clés :* Politique monétaire conventionnelle et non conventionnelle, systèmes de corridors de taux d'intérêt et de taux d'intérêt plancher, liquidité, assouplissement quantitatif, indications prospectives

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## THE CONDUCT OF MONETARY POLICY IN THE FUTURE: INSTRUMENT USE

By Kei-Ichiro Inaba, Rory O'Farrell, Łukasz Rawdanowicz and Ane Kathrine Christensen<sup>1</sup>

### 1. Introduction

The recent global financial crisis marked a major change in monetary policy instrument use. Prior to the crisis, monetary authorities in the main OECD areas, with the exception of Japan, used very few instruments and in a fairly homogenous way. The need to address first the liquidity crisis and then to stimulate demand in the face of an effective lower bound on nominal policy rates has brought about a considerable expansion of monetary policy instruments. When the economic situation normalises, monetary authorities will have to decide which of these new instruments should be retained and whether old instruments will remain valid. While considering options, they will have to take into account that the objective of financial stability is likely to be more important than prior to the crisis. Questions about the choice of instruments will also exist during the transition phase, as the future normal situation is not likely to be reached soon, or during persistent stagnation, if countries fall into this trap. This paper attempts to shed some light on these questions.

The main findings are:

- In the future normal situation, central banks could revert to targeting short-term market rates with small balance sheets, but this might require changes to monetary policy implementation due to new liquidity requirements.
- The transition to this situation will be lengthy, requiring the use of a mixture of liquidity draining instruments, including deposit facilities, issuing central bank liabilities, reverse repos and reserve requirements. The latter instrument could also serve to address some financial stability concerns.
- Central banks could alternatively adopt a floor system, where a central bank controls market rates by changing the rate it pays on ample reserves, and chooses to permanently maintain a large balance sheet so that the supply of reserves does not affect market rates. This could be beneficial for financial stability but could increase volatility of central banks' profits and their transfers to fiscal authorities.
- Large balance sheets under the floor system would allow central banks to purchase and sell securities to better manage longer-term interest rates but this would likely be complicated in practice.
- The use of unconventional measures as a substitute for policy rate cuts will no longer be needed, though some aspects could be retained:
  - The recent extension of collateral and counterparty eligibility could be kept to increase flexibility of liquidity management and accommodate liquidity shocks, contributing to financial stability.

---

1. The authors are members of the Macroeconomic Policy Division of the Economics Department. They are indebted to Sebastian Barnes, Sveinbjörn Blöndal, Richard Dutu, Christian Kastrop, Catherine L. Mann, Jean-Luc Schneider and Jan Strasky for their useful comments. The authors are also grateful to Isabelle Fakih and Maartje Michelson for help in the final document preparation.

- Permanent currency swap lines among central banks could be sustained, and possibly extended to include more countries. An alternative would be a new design for the international monetary system under the aegis of the IMF.
- In contrast, incentivised lending schemes to encourage bank lending are likely to entail net costs and forward guidance in the form of a strong commitment is not needed in normal times and likely to be ineffective.
- If countries become stuck in a stagnation trap, characterised by persistent negative demand gaps, monetary policy stimulus will be constrained to unconventional measures, and their net marginal benefits may decline when used extensively for a long time.

The remainder of this paper is organised as follows. Section 2 defines the post-recovery environment and sets out policy objectives. Section 3 briefly reviews instrument use prior to the crisis, while Section 4 summarises instrument innovation since the crisis, with details of particular measures discussed in annexes. Section 5 discusses various conventional and unconventional instruments in the post-recovery environment and during transition to it. Section 6 deals with unconventional instrument use if economics get stuck in persistent stagnation.

## **2. The post-recovery environment**

### **2.1. *The economy after the recovery***

For the purpose of this paper, the future normal economic situation in the main OECD economies, which is not likely to be achieved quickly, is taken to be characterised by four conditions:

- Inflation is back to its target and GDP growth oscillates around the potential growth rate, in the absence of persistent and large output and employment gaps. However, as globalisation and credibility of central banks are likely to be sustained in the future (Section 3.1 and Box 1), economic slack is likely to have a limited effect on inflation, posing challenges for ensuring simultaneously price and output/employment stability.
- Policy interest rates are above the zero lower bound (ZLB) and central banks have credibility in meeting inflation targets.
- The banking and financial sectors work efficiently, thanks to sound capital and liquidity positions, reflecting new bank regulation. This minimises but does not eliminate risks of liquidity shocks and financial crises. Given the history of public bailouts and assistance to safeguard financial stability during the crisis, there will be expectations that this may be repeated in the case of a future crisis. The new bank regulation may affect monetary policy implementation (Section 4.1).
- The role of shadow banking in the provision of credit to the private non-financial sector is at least as important as prior to the crisis, even if some pre-crisis shadow banking products – like securitisation – may be limited by new financial regulation.<sup>2</sup> Consequently, monetary policy

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2. The size of the shadow banking differs widely across the main OECD areas, being the largest in the United States and the smallest in the United Kingdom (IMF, 2014). The share of lending by shadow banking in overall banking sector has broadly stabilised at levels below pre-crisis peaks in Japan, the United Kingdom and the United States, but continued to increase in the euro area. At the global level, the size of shadow banks' assets have broadly stabilised on average at around 25% of total financial assets and 120% of GDP (FSB, 2014).



instruments will need to aim not only at the traditional banking sector but more broadly to have more effective control over credit, growth and ultimately inflation.

Thus, the post-recovery situation is likely to resemble the pre-crisis situation in terms of macroeconomic settings.

This scenario is consistent with the OECD's long-term baseline projections. The OECD envisages a gradual strengthening of potential real GDP per capita growth to rates higher than immediately prior to the crisis, though slightly lower than at the turn of the century (Table 1). This implies that, at the end of the current decade, long-term market interest rates and real neutral rates would not differ significantly from those prevailing before the crisis (Rawdanowicz et al., 2014b). By then, central banks will still have larger balance sheets than before the crisis, and this feature may or may not be sustained permanently (Section 5.2).

This paper focuses on the situation once economies have fully recovered, which is still a distant prospect. The timing of achieving it is likely to differ markedly across the main OECD areas and may ultimately differ from the OECD baseline projections in case of unforeseen events or adverse policy decisions.<sup>3</sup> There is also a risk that some countries could be stuck in persistent stagnation with policy rates at the ZLB. Thus, the paper also discusses the use of instruments in the transition to the normal situation in the future and in a persistent stagnation scenario.

## 2.2. *Monetary policy objectives*

The key objectives of monetary policy are assumed to remain broadly unchanged compared with the current situation.

- Ensuring price stability, and explicitly or implicitly supporting employment and economic growth, depending on the mandate of the central bank.<sup>4</sup>
- Smooth provision of liquidity and functioning of the payment system.
- Broader financial stability considerations are assumed to be taken into account to a greater extent than prior to the crisis. This is motivated by the recognition that financial stability is essential for achieving inflation and growth objectives, even if financial stability may not become a formal objective of central banks and if other authorities will be tasked with fulfilling this general objective.<sup>5</sup>

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3. In the United States and the United Kingdom, slack is projected to be largely eliminated by the end of 2016, with GDP growth above potential and inflation close to the inflation target (OECD, 2014). At the same time, policy rates are likely to be raised from the current ZLB but central bank balance sheets are likely to shrink only gradually. In contrast, in the euro area and Japan, policy rates are likely to remain at the ZLB at least until the end of 2016 and total assets of the two central banks will expand further, as inflation will remain below targets.

4. The Federal Reserve (Fed) has a dual mandate of attaining price stability and maximum employment, whereas the primary mandate of other central banks discussed in this paper is price stability.

5. Some central banks have gained more financial stability responsibilities. For instance, in the United Kingdom, the statutory objective for the Bank of England (BoE) was amended in 2009 to include contributing to protecting and enhancing the stability of the financial system. This objective is meant to be achieved, among other things, by the BoE's role as a resolution authority and lender of last resort, and by its financial stability operations.

**Table 1. Average real potential GDP per capita growth**

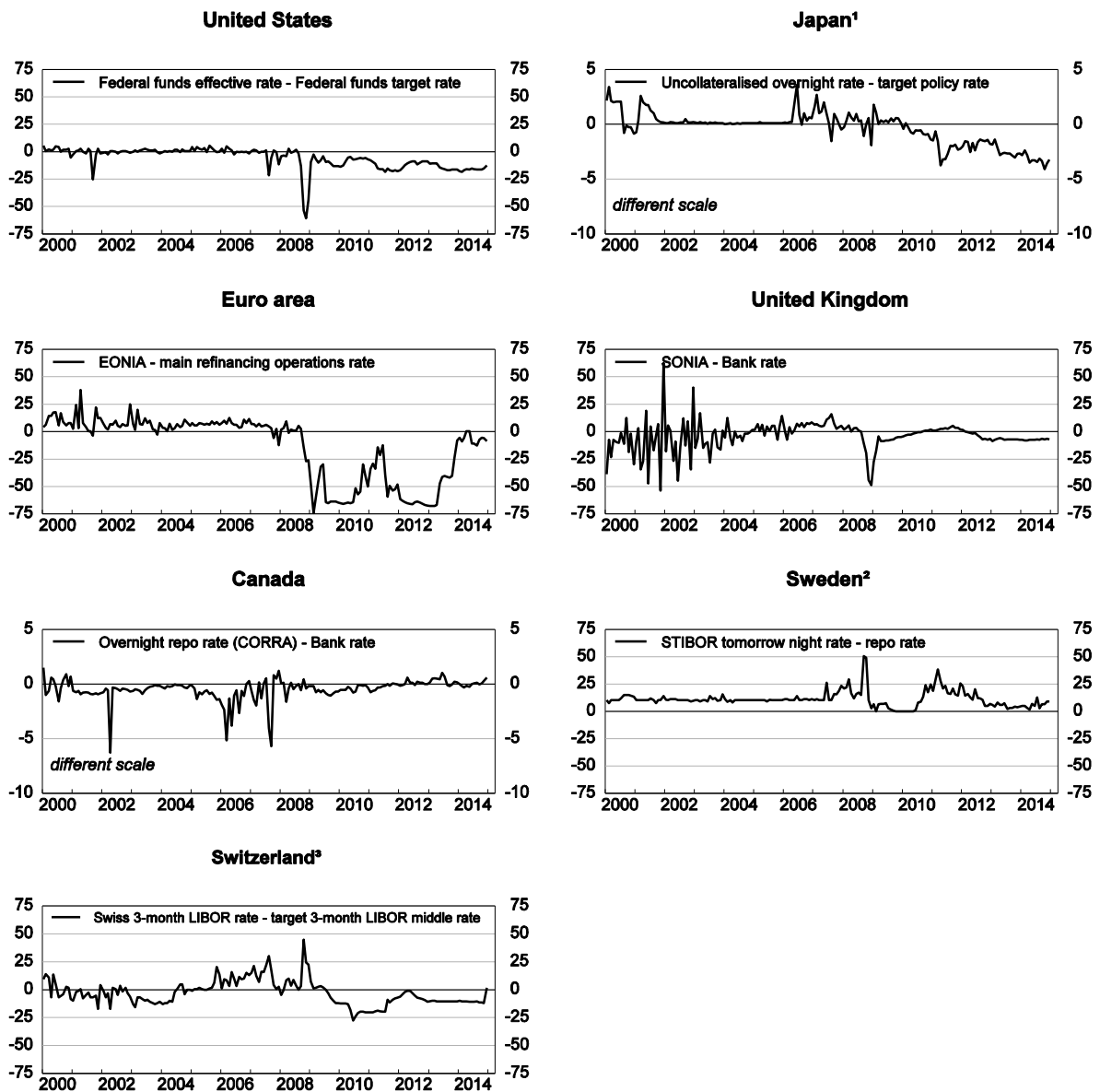
In per cent

	1998-02	2003-07	2008-12	2013-17	2018-22
United States	1.9	1.5	1.1	1.3	1.7
Japan	0.8	0.5	0.5	1.0	1.4
Euro area	1.8	1.1	0.5	0.7	1.3
Germany	1.1	0.9	1.3	1.2	1.3
France	1.7	0.9	0.5	0.9	1.5
Italy	1.4	0.3	-0.5	-0.3	1.0
United Kingdom	2.7	1.7	0.5	1.4	1.9
Canada	2.3	1.3	0.7	0.9	1.1
Australia	2.2	1.8	1.3	1.7	2.2
Austria	2.0	1.4	1.3	1.2	1.3
Belgium	2.0	1.2	0.3	0.6	1.3
Chile	3.1	3.1	3.3	3.1	3.7
Czech Republic	3.3	3.4	1.1	1.9	3.6
Denmark	1.6	1.0	0.2	0.5	1.1
Estonia	5.7	5.0	1.8	3.1	3.3
Finland	3.4	2.0	0.0	0.4	1.8
Greece	3.3	1.8	-1.4	0.1	3.0
Hungary	3.8	2.8	0.4	1.6	2.5
Iceland	2.6	2.9	0.7	0.6	1.3
Ireland	5.1	2.5	0.8	1.3	2.2
Israel	2.0	1.4	1.6	1.9	1.5
Korea	4.5	3.7	3.2	3.0	2.9
Luxembourg	3.3	2.0	0.8	0.7	1.2
Mexico	1.5	1.1	1.1	1.8	1.9
Netherlands	2.1	1.4	0.6	0.6	1.6
New Zealand	2.2	1.7	0.7	1.6	1.9
Norway	2.6	2.3	1.1	1.2	1.3
Poland	4.2	4.3	3.4	3.0	2.9
Portugal	2.3	0.7	0.1	0.2	0.7
Slovak Republic	4.0	5.4	2.4	2.7	3.4
Slovenia	3.4	2.9	0.4	0.7	1.7
Spain	2.7	1.4	0.1	0.2	0.7
Sweden	2.8	1.9	1.0	1.4	2.2
Switzerland	1.3	1.4	0.7	1.0	1.5
Turkey	1.7	2.7	3.3	2.9	3.1
China	8.7	9.9	8.8	6.8	5.1
India	4.5	5.8	6.0	4.9	5.0

Source: OECD Economic Outlook 96 database and the extension of potential real GDP growth projections based on the methodology described in Johansson et al. (2013).

**Figure 1. Spread between market and policy target interest rates**

Basis points



1. The target rate refers to the complementary deposit facility rate since 4 April 2013, when the Bank of Japan started to target the monetary base and not the money market rates.
2. The STIBOR is the Stockholm Interbank Offered Rate; it indicates an average of the overnight interest rates in the Swedish money market.
3. The target 3-month LIBOR middle rate is the average of the Swiss National Bank fixed upper and lower band rate for the target 3-month LIBOR rate.

*Note:* Monthly average.

*Source:* Bank of Canada; Datastream; and Riksbank.

### 3. The use of monetary policy instruments prior to the recent global financial crisis

Prior to the crisis, targeting short-term market rates was the central monetary policy instrument to achieve inflation and other macroeconomic objectives in the main OECD areas (Adrian and Shin, 2009). Open market operations (purchases or sales of mainly short-term sovereign securities) were used by central banks to stabilise market interest rates around the target rate. This worked reasonably well with central banks able to predict liquidity demand well, and market rates remained most of the time close to the target (Figure 1).

The implementation of interest targeting differed among central banks. Overnight money rates were targeted by the Bank of Canada (BoC), the Bank of England (BoE), the Bank of Japan (BoJ), the Riksbank and the US Federal Reserve (Fed), while the Swiss National Bank (SNB) targeted the three-month Libor. The European Central Bank (ECB) differed slightly in that, before the global financial crisis, it explicitly targeted the minimum bid rate for funds accessed through main refinancing operations instead of a money market rate. Implicitly, however, the ECB targeted the euro over-night index average (EONIA) rate (Amstad and Martin, 2011). Other differences included targeting a rate for collateralised transactions (BoC, BoE, ECB and Riksbank) versus uncollateralised transactions (BoJ, Fed and SNB).

The interest rate targeting framework also differed with respect to the use of a corridor system between lending and deposit rates (Figures 2 and 3). As all central banks offered a standing lending facility, the main difference referred to the interest rate floor:

- Offering a lending facility was a core role of central banks as the lender of last resort. The lending standing facility provided emergency liquidity and was not usually used to a great extent in normal times. For instance, this was the case in the euro area due to punitive interest rates (Bowman et al., 2010).<sup>6</sup> Thus, the influence of the lending facility rate on the economy was relatively minor. While most central banks set their lending facility rate at a premium over the target rate, the Swiss differed in that the lending facility rate was set at a premium over the Swiss average overnight rate (SARON).

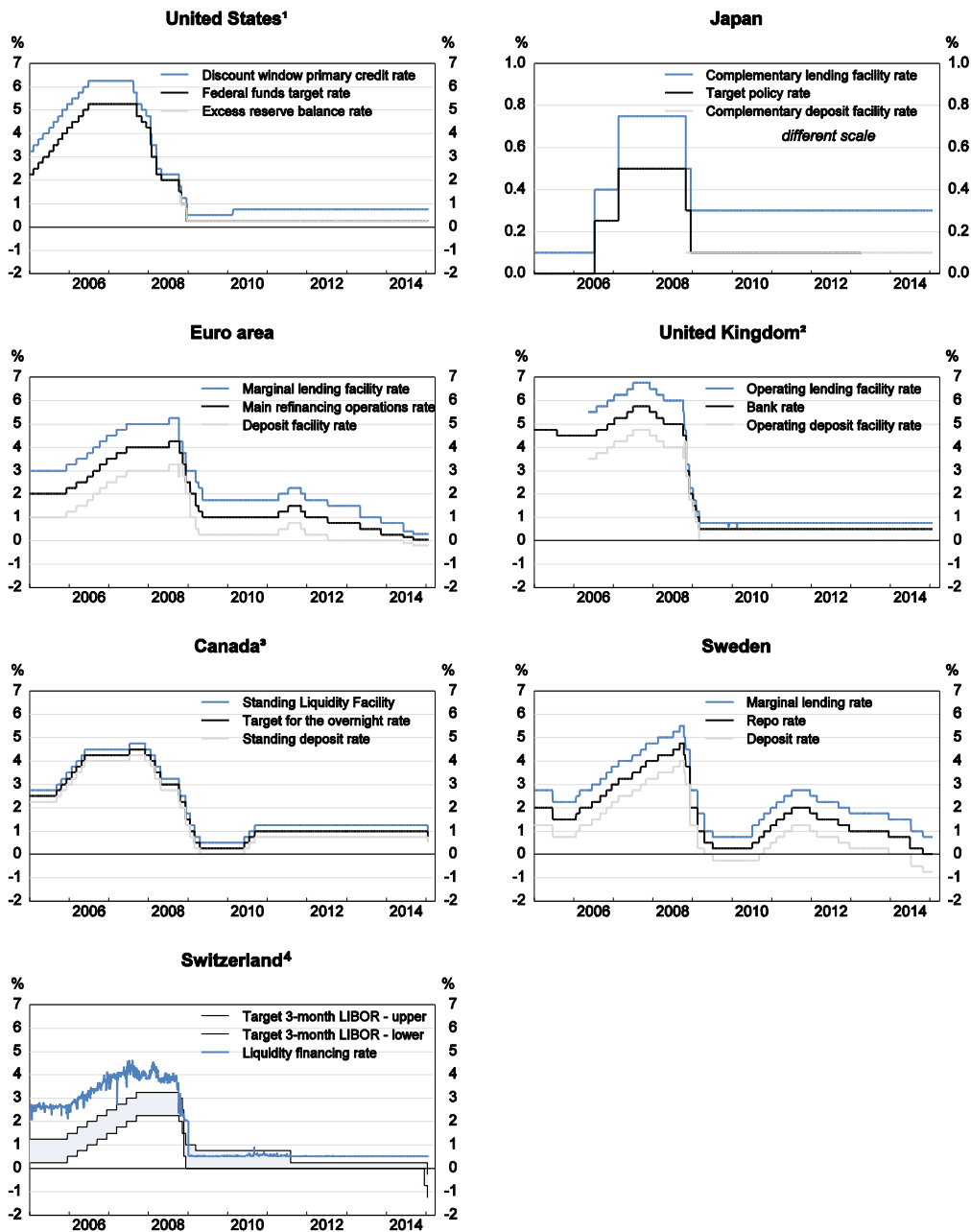
Figure 2. Corridor interest rate system



Source: Keister et al. (2008).

6. Up to 2007, the spread between policy rates and overnight lending facility rates was 1 percentage point in the euro area, the United Kingdom, and the United States; 0.75 percentage point in Sweden; and 0.25 percentage point in Canada; and 0.15 percentage point in Japan. In Switzerland, it was set at 2 percentage points above the SARON.

Figure 3. Interest rate corridors in selected OECD countries



1. The US Federal Reserve has the funds target range of 0-0.25% since 16 December 2008.
2. For the operating deposit and lending facility rate, during the period 18 May 2006 to 17 October 2008, there were special clearing rates on the first Wednesday of the month. These rates have been omitted in the chart.
3. The Bank of Canada's Bank Rate is set at the rate of the Standing Liquidity Facility.
4. As of 22 January 2015, the Swiss National Bank introduced a sight deposit rate at -0.75% for the portion of sight deposits exceeding a given exemption threshold.

Source: Bank of Canada; Datastream; Bank of Japan; Swiss National Bank; and Riksbank.

- Prior to the crisis central banks differed with regard to the remuneration of reserves. Deposit facilities were used by the BoE, the Riksbank, the BoC and the ECB; in contrast, the SNB offered central bank bills. The BoE began to remunerate reserves at the Bank rate in May 2006 as part of a reserve averaging scheme. In the euro area, required reserves were remunerated at the main refinancing rate, while the Fed and the BoJ did not pay interest on any reserves before the crisis; in effect, they operated a corridor system where the floor was set at zero.

The degree of symmetry and the width of the corridor differed across economies and over time within economies. This depended on the central banks' tolerance of market rate volatility around the target rate and perceived usefulness of market-based transactions (Bindseil and Jablecki, 2011).

#### 4. Instrument innovation since the beginning of the crisis: A summary

Most central banks have continued the traditional short-term interest targeting framework during and after the financial crisis.<sup>7</sup> However, several modifications have been introduced to facilitate emergency liquidity provision in the early phase of the crisis. Subsequently, central banks have increasingly used unconventional measures as a substitute for policy rate cuts to boost demand and raise inflation (Table 2).

- *Emergency liquidity facilities and modifications of open market operations:*
  - Central banks provided ample liquidity to financial institutions when money markets froze. This was associated with modifications to open market operations, involving a lengthening of the average maturity period, easing collateral requirements, expanding counterparties and introducing full allotment, and setting up new facilities as discussed in detail in Annex 1. Although some of these emergency measures have been closed or have been dormant, an expanded set of central bank counterparties has been kept.
  - Several central banks also set up bilateral currency swap lines to meet increased demand for liquidity in US dollars, and arrangements between six advanced countries central banks were ultimately converted to standing arrangements in October 2013 (Annex 1). Bilateral dollar swap lines were used primarily by the ECB.
- *Quantitative easing (QE).* QE policies involved purchases of longer-term high-quality securities in secondary markets (Annex 2). QE has been used mainly in Japan, the United Kingdom and the United States. Consequently, since 2007, central bank balance sheets have increased by nearly 40% of GDP in Japan and around 20% of GDP in the other two countries (Figure 4). In the euro area, QE programmes have been on a considerably smaller scale, though now are set to increase. Asset purchases involved mainly government bonds, but in the United States purchases of private assets were also important.

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7. Since the introduction of quantitative and qualitative monetary easing in April 2013, the BoJ has referred to monetary base, not short-term interest rates, as its main target for money market operations.

**Table 2. Summary of measures introduced by central banks since the recent global financial crisis**

	BoC	BoE	BoJ	ECB	Fed	Riksbank	SNB
Liquidity operations							
expanding eligible collateral	✓	✓	✓	✓	✓	✓	✓
expanding counterparties	✓	✓		✓	✓	✓	
lengthening of maturity period	✓			✓	✓	✓	
full allotment				✓			
central bank currency swap lines	✓	✓	✓	✓	✓		✓
Quantitative easing							
government bonds		✓	✓	✓	✓		
private bonds		✓	✓	✓	✓		
Forward guidance							
for policy rates	✓	✓	✓	✓	✓	✓	
for quantitative easing			✓		✓		
Temporary incentivised lending scheme		✓	✓	✓		✓	
Foreign exchange interventions							✓
Policy interest rate corridor management		✓	✓	✓	✓	✓	
Negative deposit facility rates				✓		✓	✓

Note: BoC – Bank of Canada; BoE – Bank of England; BoJ – Bank of Japan; ECB – European Central Bank; Fed – US Federal Reserve; and SNB – Swiss National Bank.

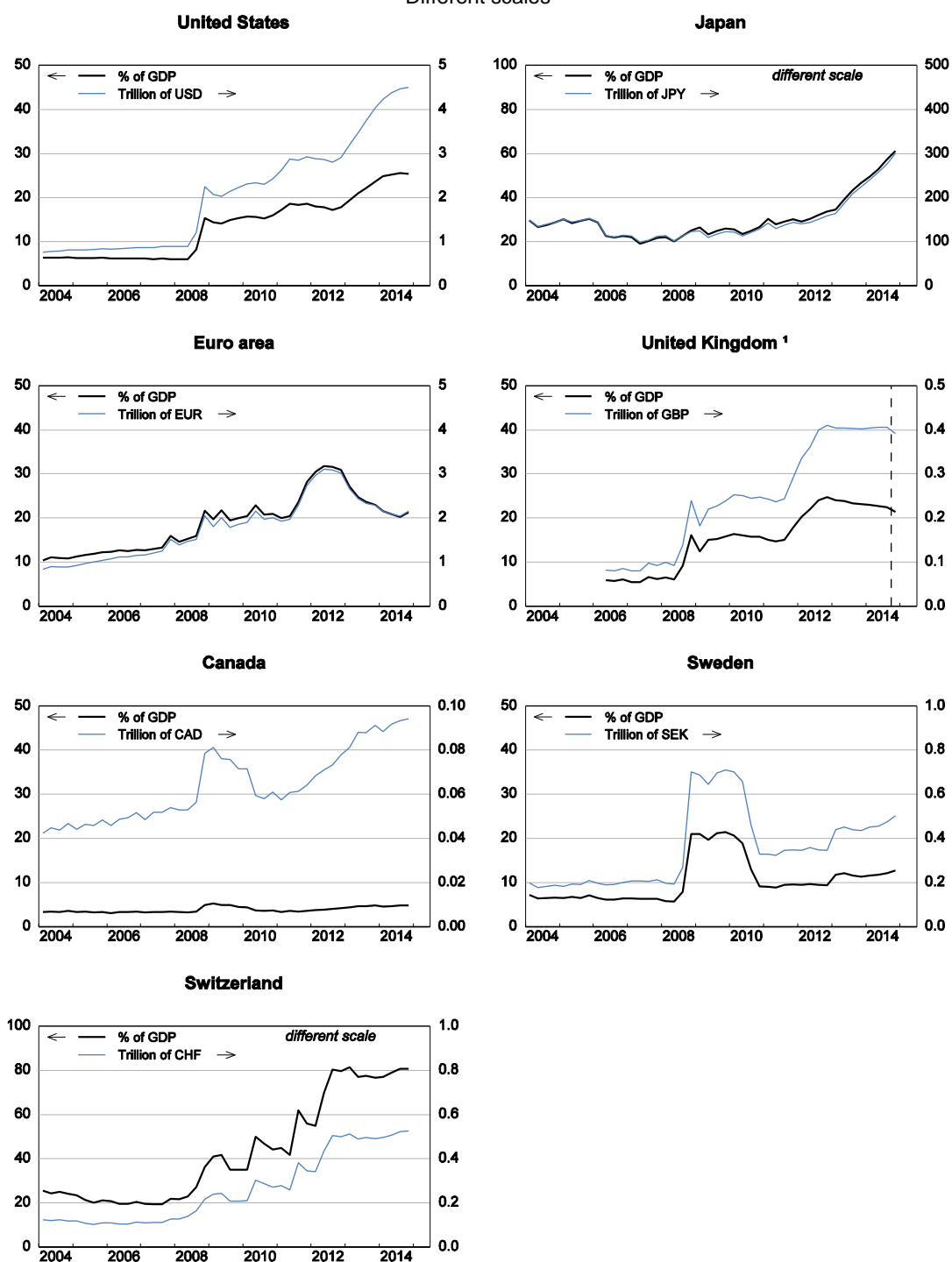
Source: OECD compilation.

- **Forward guidance.** Several central banks used various forms of forward guidance to make financial market participants expect prolonged monetary policy accommodation to lower longer-term interest rates and their volatility and ultimately boost demand (Annex 3).
- **Temporary incentivised lending schemes.** Central banks in Japan, Sweden, the United Kingdom and the euro area introduced schemes to encourage lending by commercial banks (Annex 4). Although the programmes differed somewhat, they aimed at lowering the cost of funding for banks so as to encourage them to extend credit to the non-financial private sector.
- **Foreign exchange rate intervention.** The SNB intervened in the foreign exchange market and set a floor for the euro exchange rate until mid-January 2015 to prevent the Swiss franc appreciation stemming from massive safe-haven capital inflows to the Swiss economy.<sup>8</sup> These interventions, although not a new instrument, resulted in an expansion of the SNB's balance sheet by the equivalent of approximately 60% of GDP and associated acquisition of foreign securities (Figure 4).
- **Policy interest rate corridor management.** Since 2008, several central banks have narrowed the corridors between deposit rates and marginal lending rates to support monetary policy easing and to reduce volatility in market interest rates (Figure 3; Berentsen and Monnet, 2008). From November 2013 to June 2014, the ECB operated an asymmetric corridor, by narrowing the upper part of the corridor.

8. The exchange rate floor and exchange rate interventions have been employed also by the Czech National Bank since November 2013.

Figure 4. Central bank total assets

Different scales



1. The Bank of England's consolidated balance sheet is not available before May 2006. Following changes to the Bank of England's weekly reporting regime, the total assets since September 2014 refer to the sum of balance sheet items that are released immediately.

Source: Bank of England; and Datastream.



- **Negative deposit rate.** In an effort to boost bank lending Sweden introduced a negative deposit rate in July 2009, followed by the ECB in June 2014 and the SNB in December 2014 (Figure 3).<sup>9</sup>
- **Outright Monetary Transactions (OMT) in the euro area.** In August 2012, the ECB announced it was willing to buy unlimited amounts of government bonds with 1 to 3-year maturity of individual euro area countries, subject to strict and effective conditionality by European Financial Stability Facility/European Stability Mechanism (EFSF/ESM). Although it has not been used, it is considered to have had an effect of lowering bond yields of countries in distress.

In the aftermath of the crisis, some central banks also introduced the remuneration of reserves. Though the remuneration of reserves was practiced by many central banks prior to the crisis (Section 3), the BoJ and the Fed began remunerating reserves only in 2008, and the BoE extended remuneration at the policy rate to all reserves in the same year. The measure put a floor under money market rates, helping central banks to achieve their policy rate targets (Section 5.2).

## 5. Monetary policy instruments after the recovery

After the recovery, some of the instruments introduced since the crisis could be retained if they help to conduct symmetric monetary policy and contribute to financial stability. This does not, however, preclude a return to relying primarily on instruments from the “old normal”.

### 5.1. Control of short-term interest rates with liquidity supply

There are good reasons to revert back to the pre-crisis framework of instrument use, where central banks provide the minimum amount of liquidity that is needed to stabilise market interest rates around the target (Figure 2). Most unconventional instruments will no longer be needed in the future post-recovery environment (see below) and the short-term interest rate targeting framework has the advantage that it is well understood, has a proven track record of combatting inflation (though it has been less successful at preventing deflation) and encourages inter-bank lending.

The new bank liquidity regulation, in particular the Basel III liquidity coverage ratio (LCR), may affect monetary policy implementation. The LCR requires that banks have high-quality liquid assets (HQLA) at least equal to their liquidity needs for a 30-calendar-day liquidity stress scenario. Central bank reserves count as HQLA and they already account for around  $\frac{1}{3}$  of total HQLA (BCBS, 2014). The full implementation of the liquidity requirement could increase structural demand for central bank reserves. When loans from a central bank are “invested” in high-quality liquid assets (for instance interbank loans or central bank reserves), they increase the LCR (Bech and Keister, 2012). This is because borrowing from the central bank increases net cash outflows (the LCR’s denominator) by significantly less than the amount of the loan (which enters the LCR’s numerator). Similarly, banks could increase the LCR by borrowing for more than one month as these liabilities would not enter the denominator of the LCR at all. Consequently, central banks may find it easier to adjust the supply of central bank reserves by conducting market operations with longer-term maturities rather than with overnight maturity. Since regulatory-driven demand for reserves could be higher on some days, volatility of market interest rates could increase (Bini Smaghi, 2010).

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9. Negative deposit rates existed also in Denmark between July 2012 and April 2014 and have been in force again since September 2014. They were introduced to defend the Danish currency peg to the euro as capital inflows increased following monetary policy easing by the ECB.

Reverting to this “old” framework, monetary authorities will, however, face old challenges related to an imperfect transmission of short-term policy rates to the cost and availability of credit for businesses and households and their inability to deal with risks to financial stability by controlling policy rates only. These challenges, notably securing financial stability, suggest a need for retaining some of the innovations in instrument use during the crisis (as discussed below) and for accompanying micro and macro-prudential instruments to ensure stability in the banking sector and financial markets more generally.

Central banks will also likely face challenges in meeting the inflation objective by controlling short-term interest rates because policy-induced changes in demand may have a limited impact on price formation. This is because of phenomenon referred to as the flattening of the Philips curve, which is explained by a combination of three factors: greater credibility of central banks, globalisation, and downward nominal price and wage rigidities in a low-inflation environment (Box 1). If the Philips curve remains flat in the future, shifts in inflation due to shocks will be muted and the monetary authorities’ ability to return inflation to target will depend on the degree of the credibility of their inflation target. The strength of credibility is likely to depend on the overall monetary policy framework rather than specific instrument use.

If central banks decide to reduce the size of their balance sheets to close to the pre-crisis level and return to adjusting the quantity of liquidity with the aim to control short-term market rates, policy instruments in the transition will differ from the appropriate instrument use in the future post-crisis environment. During the transition, while balance sheets are in the process of shrinking, the main challenge will be to absorb excess liquidity. This can be done by using several instruments that affect the composition but not the size of a central bank balance sheet (Table 3):

- *Issuing central bank liabilities.* Most central banks have the option to issue central bank bills, but many have not used it actively so far.<sup>10</sup> Central bank bills have the advantage that they can be held by institutions other than those who interact directly with central banks (Minegishi and Cournède, 2010). Their effectiveness depends on financial institutions willingness to buy them. Moreover, central bank bills can potentially interfere with the issuance of government debt. This can be overcome by choosing a shorter maturity than typical for government debt and using large denominations that are not convenient for retail investors (Amstad and Martin, 2011).

**Table 3. Availability of liquidity draining instruments**

	BoC	BoE	BoJ	ECB	Fed	Riksbank	SNB
Central bank bills		✓	✓	✓		✓	✓
Reverse repos	✓		✓	✓	✓		✓
Reserve requirement			✓	✓	✓		✓
Deposit facility/interest on excess reserves	✓	✓	✓	✓	✓	✓	
Interest on required reserves	n/a	n/a		✓	✓	n/a	
Segregated cash account							

Note: “n/a” stands for not applicable.

Source: OECD compilation.

10. The Fed is an exception. However, in principle, it could conclude an agreement with the government, as was already done in the past, where the government issues short-term securities and deposits proceeds with the Fed (Minegishi and Cournède, 2010).

### Box 1. Policy implications of the flattening of the Phillips curve

The flattening of the Phillips curve, whereby inflation appears to be less sensitive to economic slack than it was in the past, was described as a stylised fact before the recent global financial crisis (Mishkin, 2007). This phenomenon seems to have been sustained in the aftermath of the recent crisis in view of remarkably stable inflation given the depth of the recession (Moccero et al., 2011; Stevens, 2013; Bayoumi et al., 2014; Clark, 2014; and Rusticelli et al., 2015).

Explanations for why the Phillips curve may have flattened can be divided into explanations that give an increased importance to the role of external supply shocks (such as globalisation), those that imply that central banks have become more effective (by better anchoring of expectations), and those that are related to downward nominal rigidities (IMF, 2006; Woodford, 2010; and IMF, 2013b). No consensus has been reached as to why the Phillips curve may have flattened. The IMF (2006) concludes that medium-term inflation is determined by the nominal anchor, despite giving globalisation an important role. In contrast, Gordon (2013) questions the existence of a flatter Phillips curve as the finding is highly sensitive to specification choices, and White (2008) suggests that the flattening may be due to a series of positive supply shocks occurring during the sample period. Gordon (2013) suggests that changes in how the inflation rate responds to changes in demand factors (such as unemployment) can be explained by offsetting supply shocks that are missing in some specifications. This can be reconciled with common specifications by suggesting that globalisation is a permanent supply shock and can flatten the Phillips curve. Also, under-estimating the size of past output gaps could lead to the illusion of a flattening Phillips curve.

The policy implications of a flatter Phillips curve depend crucially on its underlying causes with different causes leading to opposing conclusions:

- A greater importance of external factors in domestic inflation could change the inflation-output trade-off, allowing central banks to tolerate slightly higher inflation in return for higher output, assuming expectations remain anchored. However, central banks would need to impose a larger change in GDP in order to control inflation (Iakova, 2007).<sup>1</sup> A flatter Phillips curve due to globalisation could potentially restrict the ability of central banks to influence inflation, and central banks may manipulate the exchange rate with the aim of controlling domestic inflation. However, Woodford (2010) concludes that it is difficult to conceive of a scenario whereby globalisation would interfere in any substantial way with the control of domestic inflation through the use of domestic monetary policy.
- Inflation expectations depend on people's views of the effectiveness of monetary policy. Tolerating slightly higher inflation when the economy is above potential could lead to inflation expectations becoming unanchored (Bayoumi et al., 2014), and the Phillips curve becoming steeper again. Stevens (2013) suggests that the interest rate channel of monetary policy has become more effective, as inflation is now more sensitive to inflation expectations, leading to inflation being close to central banks targets. Large changes in GDP are not needed to control inflation as inflation is controlled by the anchoring of expectations.
- Regardless of the cause of flattening, a flatter Phillips curve reduces the information that can be gained from inflation fluctuations, and small deviations from the inflation target may hide large imbalances (Stevens, 2013). In an extreme case, a flat Phillips curve means that there is no way to estimate the NAIRU, leaving central banks "steering the economy in a fog with no navigational device to determine the size of the unemployment gap" (Gordon, 2013). Central banks may wait to see if shocks to inflation are temporary or permanent before reacting to inflation (Bayoumi et al., 2014).

1. Using a New Keynesian model, Iakova (2007) finds that if expectations remain anchored, a flatter Phillips curve implies that deviations of inflation from target will be more persistent due to a lack of action by the monetary authority.

- *Reverse repos.* They enable central banks to absorb excess liquidity by borrowing money from financial institutions in exchange for collateral held by central banks. The reverse repos can be offered by a central bank to a broad range of financial institutions, but they are tied to particular assets and are not transferable, unlike bills.
- *Reserve requirements.* Currently, reserve requirements are very low in most central banks.<sup>11</sup> Raising them would shift a proportion of excess reserves into required reserves and reduce loanable funds in the money market. This could not only allow central banks to influence credit dynamics but also to address financial stability concerns. If they apply to short-term banks' debt, they could act as Pigouvian tax on harmful externality stemming from systemic fragility due to runs (Kashyap and Stein, 2012). To be effective in this role, reserve requirements would have to apply to all forms of short-term debt. However, high reserve requirements, by reducing net bank profits, could discourage banks from enhancing the quality of loan portfolios.<sup>12</sup>
- *Deposit facility.* Providing a remunerated standing deposit facility is operationally an easy way to drain excess liquidity but its use is voluntary. Offering a longer-term deposit facility would allow central banks to withdraw liquidity more durably and could help fulfil the new liquidity regulation (see above). The effectiveness of this instrument is limited by counterparty eligibility, which usually excludes important financial institutions.
- *Segregated cash accounts.* These are an innovation currently being considered by the US Fed. They allow commercial banks to offer deposit accounts that are backed using (remunerated) central bank reserves as collateral.<sup>13</sup> In effect, this is 100% reserve banking. Liquidity would be drained from the interbank market as the reserves pledged as collateral are not available for other transactions. Such accounts strengthen the floor on interest rates (given by the rate of remuneration of reserves) as competitive pressures should ensure that the deposit rate offered by commercial banks is close to the remuneration rate chosen by the central bank. This creates a new channel for the influence of central banks' policy, and will result in changes in policy rates affecting a wider range of counterparties. Also, a core reason for the creation of such accounts is to meet the demand for safe money, free from the risk of runs, in large denominations, which helps financial stability. The size of segregated cash accounts will be mainly driven by private depositors and thus their decisions may affect the size of the central bank's balance sheet.

Given no clear superiority of any of the above measures, using a mix of them would be most desirable.

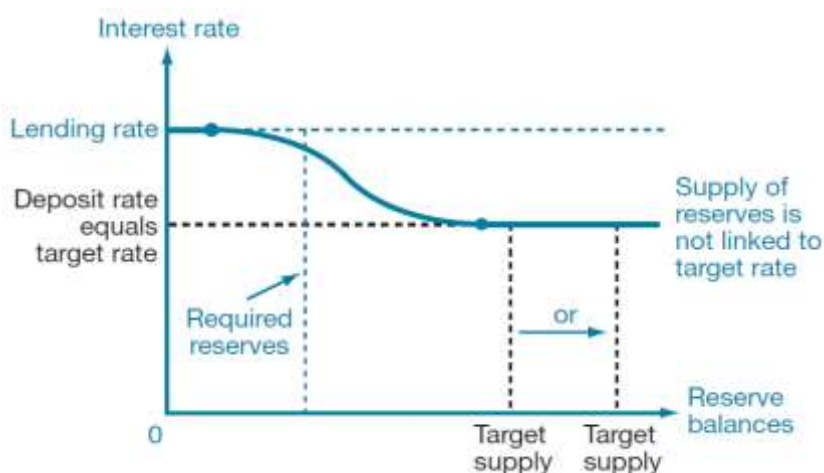
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11. Reserve requirement ratios frequently vary according to the size of the bank. In Japan the required reserves are up to 1.2% for banks with over 2.5 trillion yen in time deposits, or 1.3% for banks with over 2.5 trillion yen in other deposits; in the euro area 1% for deposits and debt securities with a maturity of up to two years (and zero for deposits and securities with over two year maturity); in the United States, from January 2015 10% of liabilities for banks with over \$103.6 million in net transaction accounts (mainly checking accounts) at the institution, 3% for those with between \$14.5 million and \$103.6 million in net transaction accounts, and 0% for those with under \$14.5 million in net transaction accounts; and in Switzerland 2.5% for relevant short-term liabilities, and 20% for savings and investment accounts.
  12. Such unwanted consequences were observed in Turkey in 2011 (IMF, 2012).
  13. This option is currently under discussion in the Fed.

Transition will take a long time given the legacy of QE measures.<sup>14</sup> In order to minimise risks of market volatility, the reduction of central banks assets is likely to be gradual, even if it were to involve active selling of securities instead of letting them mature. Indeed, the Fed has announced plans to normalise its balance sheets only gradually.<sup>15</sup>

## 5.2. *Control of short-term interest rates under a floor system with abundant excess liquidity*

An alternative way to control short-term interest rates is to adopt a floor system with abundant excess liquidity. In such a system, a central bank controls money market rates by setting a rate it pays on excess reserves to discourage financial institutions to lend below this rate (Goodfriend, 2002; Keister et al., 2008; and Gagnon and Sack, 2014). This rate becomes the main policy rate. Thus, market rates are no longer controlled by adjusting the quantity of reserves via open market operations.<sup>16</sup> In this system, the central bank sustains sufficiently large reserves (balance sheet), primarily thanks to outright purchases of assets, so that changes in reserves have very little impact on short-term market interest rates (i.e. at a level where the demand curve is flat at the target rate – Figure 5).

Figure 5. Floor interest rate system



Source: Keister et al. (2008).

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14. For instance, in the United States and the United Kingdom, it would take more than 10 years to reduce central bank balance sheets closer to the pre-crisis levels by allowing securities to mature instead of selling them (Rawdanowicz et al., 2014a).
  15. The Fed intends to reduce its securities holdings in a gradual and predictable manner, mainly by ceasing to reinvest repayments of principal on securities. It expects to cease reinvestments (or start their phasing out) after first policy interest increases, depending on economic and financial conditions. The Fed does not expect to sell agency mortgage-backed securities in the short and medium term.
  16. In 2006, the Reserve Bank of New Zealand was the first central bank to adopt the floor system (Keister et al., 2008).

The main benefits of the floor system are:

- The central bank can set the amount of reserves without affecting market interest rates and address shocks to liquidity without a need to adjust policy rates. This is in contrast with the traditional framework, where ample excess reserves make the control of market interest rates challenging (Section 5.1).<sup>17</sup>
- Ample excess liquidity could support financial stability considerations not only at times of financial stress. Reserves are perfectly liquid, provide risk-free store of value, are used to make interbank payments and would help banks reach Basel III requirements for safe assets (Section 5.1; and Amstad and Martin, 2011).
- The floor system with large liquidity also removes inefficiency related to unremunerated reserves which act as a distortionary tax on financial intermediation (Gray, 2011). As banks are usually obliged to maintain reserves, the cost of holding them increases the cost of banking services. Banks use resources to avoid holding reserves, but as the supply of such reserves are fixed by the central bank, these resources are wasted from a social point of view (Keister et al., 2008).

There are, however, several challenges related to the floor system (Goodfriend, 2002):

- *Reduction in activity in the overnight interbank market and related loss of information.* With less frequent inter-bank trades, market participants could have less incentive to monitor the creditworthiness of counterparties. Modifications of the floor system are possible to encourage interbank activity, which would, however, weaken the floor. For instance, a limited amount of reserves could be remunerated at the target rate, and the remaining part of reserves could be remunerated at a lower rate.
- *Financing of interest payments on reserves.* Remuneration of reserves would imply higher central bank interest expenses (Box 2). This challenge is, however, not unique to the floor system. Even if they could be covered by higher returns on central bank assets,<sup>18</sup> they could lead to cash flow problems (everyday interest payments would have to be covered with less frequent earnings on assets) and be politically unpalatable as financial institutions would be receiving public transfers.
- *Moral hazard.* As discussed in Section 5.4, ample liquidity could weaken market discipline.

Wide access to remunerated central bank reserves would make the interest rate floor more binding. When financial institutions participating in the overnight market do not have access to a deposit facility, arbitrage will be limited and the market rate will be below the floor (Gray, 2011). Also, if those with

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17. For instance, after the 9/11 attacks the Fed allowed the funds rate to fall below the target for several days when providing ample liquidity (Keister et al., 2008). Similarly, euro area effective market rates fell substantially below target rates for a long period after 2008 (Minegishi and Cournède, 2010), though they are now closer to the policy rate as this has been lowered (Figure A1.1 in Annex 1).

18. If assets consist mainly of longer-term government bonds, their returns should exceed the interest payments on reserves, as longer-term bond yields would most of the time be higher than the overnight target policy rate (Goodfriend, 2002). However, their longer maturity implies a slower pass-through from market interests to central bank's earnings, in contrast to the cost of reserve remuneration. Larger balance sheets can therefore affect the volatility of central bank's profits. In particular, as interest rates rise after a prolonged period of very low interest rates, central bank's profits may decline given an immediate need to remunerate reserves at a higher rate and temporarily stable income from assets.

access to central bank facilities are small in number, they may have limited market power (Bowman et al., 2010). The Fed has already stated that it would use reverse repurchase agreements (reverse repos) to set the floor on market rates for institutions that cannot place funds in deposits at the central bank, including money market funds, government-sponsored enterprises, banks and primary dealers. The Fed, however, intends to use this instrument only to the extent necessary and phase it out when no longer needed for controlling the federal funds rate (FOMC, 2014).

The optimal level of central bank reserves in a system depends on the maturity profile of commercial banks' assets and liabilities, as well as the frequency and magnitude of liquidity crises. A structural surplus of reserves in the financial system can boost financial stability. It helps banks meet their transaction needs, particularly in a time of financial stress without resorting to fire-sales, and meet new regulatory requirements. Marginal benefits of large reserves for financial stability are likely to be diminishing. Moreover, ample reserves stemming from large asset purchases come at the cost of distorting financial markets (in an extreme case leading to perceptions of monetisation of sovereign debt), reduced reliance on inter-bank overnight lending (reducing market discipline), an increased balance sheet risk, and the costs of managing a large central bank balance sheet. The optimal level of reserves in the system would thus depend on the balance of these costs and benefits.

### 5.3. *Outright purchases and sales of securities to control longer-term interest rates*

Quantitative easing to lower longer-term interest rates and boost other asset prices – as a substitute for policy rate cuts at the ZLB – should no longer be needed in the new post-recovery environment. Monetary authorities could, however, consider controlling longer-term interest rates. The main rationale for such an objective is that longer-term interest rates are more relevant to investment decisions of firms and households. Moreover, if controlling the long-term interest rate is effective, it could prevent financial instability stemming from abrupt shifts of investors' sentiment.

Longer-term interest rates could, in principle, be controlled by purchasing and selling longer-term securities in the secondary market and thus adjusting term premia. Such targeting would, however, be difficult to implement:

- Longer-term interest rates are more difficult to control and pursuing a long-term rate objective may undermine central bank credibility. It remains uncertain if temporary fine-tuning purchases and sales of securities in normal times would materially affect term and risk premia and market expectations of future policy rates. Implementation lags in transacting assets may further complicate the task. Symmetric interventions would also imply that central banks would have to hold a larger than pre-crisis stock of longer-term securities.
- It is not clear which long-term rates a central bank should target. One option is to focus on long-term sovereign bond yields, as they are often a reference rate for the borrowing cost in the private sector. Targeting government bond yields would, however, interfere with fiscal policy (Box 2), weaken market discipline and create market distortions, limiting information conveyed by longer-term rates. Consequently, the independence of a central bank could be compromised. Similar challenges would be faced when targeting corporate bond yields, as this could interfere with credit allocation in the economy.
- Controlling longer-term interest rates would imply that central banks would need to have a view about the appropriate level of bond prices, which is inherently difficult.

### Box 2. Interdependence of fiscal and monetary policy

Beginning in the 1980s, monetary policy has been separated from fiscal policy and government debt management. This has the advantage of enhancing central bank independence, reducing risks of fiscal dominance, and allowing routine standardised debt issuance to be managed by a specialised agency. Since the crisis, the increase in central bank holdings of government debt, greater risk on central bank balance sheets and rising debt as a proportion of GDP make monetary, fiscal and debt management policies de facto interdependent.

During the crisis these interactions between policies increased as some central banks bought large amounts of government bonds to flatten the yield curve and reduce long-term interest rates (Annex 2). However, this gave debt management agencies the incentive to issue more long-term debt (Rawdanowicz et al., 2011). Agencies have indeed lengthened the maturity profile of debt, offsetting some of the effects of QE (Turner, 2014). Debt servicing costs have fallen as at least part of the government interest payment to central banks for their bond holdings are ultimately returned to the government in the form of central bank profits.<sup>1</sup>

As central banks unwind their bond holdings in the transition phase to the post-recovery environment, there should be few implications for fiscal or debt management policies if bonds are held to maturity and this policy is announced in advance.

- Central banks may be hesitant to increase policy interest rates while selling bonds as this may lead to a capital loss, and in extreme circumstances may require a capital injection from government, undermining central bank independence. As central banks aim to unwind long-term positions they may be perceived as under pressure not to increase funding costs for governments. One option to overcome this is for central banks to swap long-term bonds for shorter-dated government debt (Turner, 2014).
- As interest income earned by central banks on bonds will remain relatively stable due to holdings of long-term bonds but remuneration rates for reserves are likely to increase in line with policy rates, central banks could suffer a net operating loss as interest rates increase. However, such losses are limited because, as bonds mature, the level of reserves will contract, which will reduce the level of reserves to be remunerated. Moreover, such losses should be seen in the context of big profits in recent years.
- If central banks decide to absorb liquidity by issuing bills, these should be co-ordinated with government debt management agencies.

Even if central banks decide to maintain large balance sheets after the recovery, central banks will need to reduce government bond holdings in line with falls in government debt. Otherwise central banks would hold an increasingly large share of government debt, and this market dominance could reduce the liquidity of government bonds (Rawdanowicz et al., 2013). Savings to government financing costs from central bank holdings of bonds may be reduced by the need to remunerate reserves, as large central bank balance sheets imply a structural surplus of reserves.

In the event of secular stagnation it is likely that unconventional monetary policy measures would continue. Increasing government debt levels can create an incentive to reduce debt through inflation. If markets believe there is a risk of debt monetisation – an option that could be considered (Turner, 2013), then perceptions of fiscal dominance could shift inflation expectations abruptly. Governments could show that they are also committed to meeting inflation targets by issuing debt of short maturity or by issuing bonds indexed to inflation (Rawdanowicz et al., 2011). Also, ever larger balance sheets increase the risks faced by central banks, and ultimately any losses may have to be financed by government.

1. Within the Eurosystem, whether such interest payments are channelled back to the country making the payments depends on the circumstances under which the bonds were bought.



#### 5.4. *Liquidity provision to financial institutions*

Flexible liquidity provision through central bank open market operations in the future could enhance central banks' operational capacity and deal with possible liquidity shocks.<sup>19</sup> This could be achieved via standard standing facilities that include some of the modifications adopted since the crisis, to deal with institution-specific liquidity demand.

- Sustaining a wider variety of eligible collateral in standard lending facilities, including less liquid assets, is desirable as it gives more flexibility for financial institutions to manage liquidity and ensure access to liquidity in case of a negative financial market shock. In any case, based on the experience during the crisis, banks will most likely assume in future crises that central banks will accept collateral of lower quality than normal. However, retaining existing facilities provides a framework that gives some certainty about what kind of assets are eligible as collateral and the haircuts involved. Expanded collateral eligibility should not entail too high a credit risk for a central bank that is not justified in normal times. This should be addressed by setting conservative haircuts but also prudential regulation, which may minimise chances of a bank bankruptcy.
- Sustaining permanent longer maturity of standard liquidity provision, on top of overnight lending, could be considered as it facilitates liquidity management of banks and could reduce reliance on other sources of finance, such as borrowing in the wholesale market, that are prone to be withdrawn abruptly at times of market stress. For instance, the BoE currently offers on a permanent basis 6-month lending via Indexed Long-Term Repo operations.
- Central banks could consider expanding the list of counterparties in standard facilities beyond mainly depository institutions. The Fed has already been exploring ways to expand access to open market operations beyond primary dealers via two pilot programmes.<sup>20</sup> Expanding non-bank access to placing funds and borrowing at the central bank would reduce the risk of liquidity crisis, and would allow the central bank to better control money market rates (Section 5.2). This may, however, entail higher credit risks for a central bank, and would have to be accompanied by an enhanced oversight and supervision of non-banks.

Central banks could also maintain on a permanent basis specific programmes to address system-wide liquidity problems as this would ensure a transparency and predictability of emergency liquidity provisions. For example, such facilities that were allowed to expire in the United States could be reinstated, along the lines of the UK dormant facility (Contingent Term Repo Facility) that can be activated in a time of market stress (Annex 1).

While providing ample liquidity to a broader financial sector could improve resilience to negative liquidity shocks and thus financial stability, it may entail moral hazard. A potential difficulty in obtaining liquidity can be a source of discipline and limit excessive short-term liabilities of financial institutions and resulting risks to financial stability (Diamond and Rajan, 2001; Stein, 2012a). Such risks could be present

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19. The injection of ample liquidity directly to financial institutions during the crisis was successful in preventing runs and maintaining confidence in financial markets (IMF, 2013a; Ragan, 2013).

20. Between July 2013 and July 2014, the Federal Reserve Bank of New York (FRBNY) conducted second-market outright purchases of US Treasuries with four firms under the Treasury Operations Counterparty Pilot Program. In November 2014, the FRBNY selected three firms to participate in the Mortgage Operations Counterparty Pilot Program to act as counterparties in agency mortgage-backed securities operations.

even without generous access to central bank liquidity though, if financial institutions expect central bank intervention. To limit moral hazard, a complete adoption of Basel III regulation will be essential and better regulation of financial institutions outside the core banking sector, if they were to have access to central bank liquidity, will be needed. The central bank would have to be able to assess the solvency of all counterparties.

### 5.5. *Currency swap arrangements between central banks*

Maintaining international currency swap lines between central banks will be a useful insurance instrument after the recovery as they could address short-lived foreign currency liquidity problems and prevent broader financial instability with negative economic consequences (Section 3 and Annex 1). Expanding such *permanent* safety-net arrangements to more central banks and more currencies, including those in emerging market economies (EMEs),<sup>21</sup> may be an option as they would ensure a predictable and transparent mechanism to deal with such an eventuality. This would be desirable given growing importance of EMEs in the global economy. Alternatively, it could be envisaged to replace or supplement bilateral swap arrangements with a multilateral one, for instance under the aegis of the IMF, whereby, for example, multilateral institutions could get international liquidity to distribute it where it was most needed. Such an arrangement could cover more economies, benefiting global financial stability. Providing reserve currency central banks with guarantees on potential losses may encourage them to establish currency swap lines with more countries than at present. The use of swap lines among central banks could depend on whether a country has access to other instruments, like the IMF's Flexible Credit Line (FCL) or Precautionary and Liquidity Line (PLL).<sup>22</sup>

Currency swap arrangements would have to balance risks to central banks which provide liquidity against benefits from preventing negative feedback effects from global financial instability. Given the risk of central bank losses and the international dimension of such a measure, they would have to be agreed with fiscal authorities. Central bank emergency liquidity provisions, facilitated by permanent currency swap lines may give rise to moral hazard, encouraging excessive currency exposure. To limit such risks, the sharing of information among central banks about foreign exchange exposure of domestic financial institutions would be necessary (IMF, 2010). In any case, financial regulators should monitor currency exposures of financial institutions and prevent their excessive build-up. However, even with more efficient regulation, excessive currency mismatches cannot be ruled out. Emergency foreign currency liquidity available to central banks in EMEs could also help reduce their excessive foreign exchange reserves.

### 5.6. *Forward guidance*

In the future post-recovery environment, forward guidance as a commitment tool to deal with the lower bound on policy rates will no longer be needed, especially as its effectiveness has been questioned (Annex 3). Nevertheless, central banks could aim at increasing transparency about their reaction function to increase the predictability of monetary policy actions and minimise the risk of policy-induced instability

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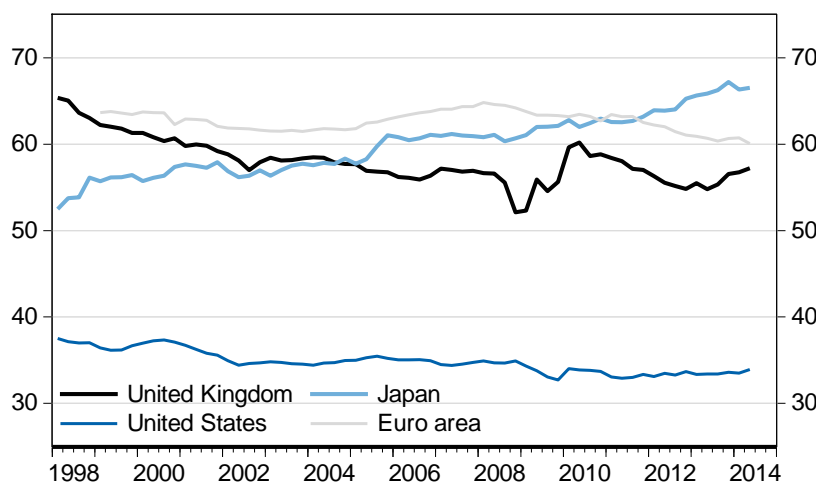
21. Based on the experience of the Asian currency crisis, five ASEAN countries, China, Japan, and South Korea established a network of bilateral swap arrangements under the Chiang Mai Initiative in 2003. Subsequently, other five ASEAN countries joined it. The bilateral arrangements consolidated into one contract in March 2010. The current total amount of bilateral arrangements is \$120 billion, with China, including Hong Kong, and Japan being the largest contributors.

22. These programmes are intended to meet the demand for crisis-prevention and crisis-mitigation lending for countries with very strong policy frameworks and track records in economic performance. Colombia, Mexico, and Poland have used the FCL but have not drawn any funds. The Former Yugoslav Republic of Macedonia and Morocco have used the PLL.

in financial markets, even if this is inherently difficult to achieve. Such guidance is particularly relevant if monetary authorities follow a rule-based policy. This is rarely the case in practice, even if advocated by some scholars (Taylor, 2014). Also, rule-based policy will be more challenging to implement with financial stability considerations, given difficulties to summarise them in a small number of indicators.

Understanding of the policy reaction function by financial markets could be facilitated by regularly publishing interest rates and macroeconomic projections by central banks as currently done in the Czech Republic, Iceland, New Zealand, Norway and Sweden (Svensson, 2009). This approach faces, however, practical challenges related to: poor long-term forecasts of central banks; difficulty in getting consensus projections among policy board members; discontinuity of policy board members; and little evidence that markets heed to the path of policy rates announced by central banks (Goodhart, 2013). Moreover, the expected path of policy rates is a weak conditional commitment of future policy actions, reducing its influence on market expectations (Woodford, 2012). Such guidance could also have potential unintended negative consequences. For instance, if guidance results in homogenous market expectations of future policies, reactions of financial markets to shocks could be magnified (Sheard, 2013).

**Figure 6. Share of bank credit in total credit to the non-financial private sector**



Source: OECD calculations based on Bank for International Settlements data.

### 5.7. *Incentivised lending schemes to encourage bank lending*

With a properly functioning banking system, incentivised lending schemes to encourage bank lending by providing central bank cheap funding would not be justified in the absence of market failures. While such programmes can prevent negative feedback loops between the real economy and declining bank lending due to unavailability and a high cost of bank funding, these benefits disappear in normal times. Moreover, a uniform cost of financing for all banks disregarding their standing would eliminate the disciplinary role of market-based bank financing and competition.<sup>23</sup> If such programmes have credit growth objectives and were not accompanied by efficient banking supervision, they could also encourage credit expansion to less creditworthy borrowers, with possible negative implications for financial stability in the future. Moreover, these programmes constitute public transfers with fiscal implications, blurring the role of the central bank. Such programmes would also be needed less in countries where banks play a small role in credit provision to the non-financial private sector, such as the United States (Figure 6). In contrast,

23. In fact such programmes introduce some differentiation of the cost of borrowing through collateral. For weak banks it may be more costly to provide high-quality collateral.

one argument in favour of maintaining such programmes relates to financial stability. Reducing the dependency of banks to run-prone liabilities by greater funding from the central bank would make the banking sector less susceptible to runs (Cochrane, 2014).

### **5.8. Foreign exchange interventions**

Foreign exchange interventions are frequently considered a beggar-thy-neighbour policy as attempts to promote exports by competitive devaluation at the expense of other countries or preventing exchange rate appreciation, even if there is some evidence that at present exchange rate changes have a limited effect on current account positions (Ollivaud et al., 2015). However, they can be justified to reduce temporary exchange rate volatility, though it can be difficult to establish the nature of currency movements. The aim should be to smooth temporary exchange-rate fluctuations rather than resist changes driven by fundamentals (Bayoumi et al., 2014). As noted above, Switzerland launched foreign exchange interventions in 2009 as the perception of Switzerland as a safe haven led to capital inflows and currency appreciation and ensuing deflation. While foreign exchange intervention as a potential instrument in times of financial stress should be kept, exchange rate interventions should not be used in normal times when exchange rate movements should reflect primarily changes in fundamentals.

### **5.9. Outright Monetary Transactions in the euro area**

The euro area may benefit from having a permanent instrument to deal with financial distress of individual solvent governments. In an incomplete monetary union, such turbulence could undermine the integrity of the euro area and impair the monetary transmission mechanism. The OMT programme of the ECB could play such a role. The OMT is a dormant programme and has not yet been used (Section 4). Its effectiveness could be strengthened by clearing legal uncertainties. The OMT programme implies potential debt burden sharing among the euro area countries, which may be against the spirit of Treaty on the Functioning of the European Union (Mody, 2014).<sup>24</sup> However, the presence of the OMT could come at the cost of higher moral hazard as governments may run irresponsible fiscal policies and fail to implement required structural reforms, hoping to be rescued by the ECB.<sup>25</sup> In the future, such risks could be reduced by recently introduced EU rules.

## **6. Instruments in persistent stagnation**

Transition to the post-recovery environment will be delayed for a long period if a country falls in a low-inflation and low-growth trap, with policy rates stuck at the ZLB. Japan has already experienced deflation/low inflation and policy rates at close to the ZLB for almost two decades. Now the euro area shows signs of approaching such a stagnation trap (Rawdanowicz et al., 2014b). Risks of falling into such a trap necessitate a mix of monetary, fiscal and structural measures. The presence of hysteresis effects strengthens the case for accommodative policies.

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24. In early 2014, the Germany's Federal Constitutional Court (FCC) referred the ruling about the legality of the OMT to the EU Court of Justice (CoJ). In January 2015, the Advocate General of the CoJ gave opinion, indicating that, under certain reservations, the OMT programme is in line with European Union law, does not constitute a conflict with the prohibition of monetary financing of government debt nor with the no-bail-out clause of the Treaty of the European Union. The German FCC has still the right to judge whether EU legislation is in line with the German constitution.

25. Once in the OMT programme, countries will be under strict conditionality of EFSF/ESM, limiting moral hazard.

On the monetary policy side, stimulus is constrained to unconventional measures, including QE, forward guidance and incentivised lending schemes to encourage bank lending. While decisive monetary policy stimulus can contribute to addressing deficient demand challenges, with longer-term benefits for the economy, decisions to expand current programmes would have to take into account the possibility that net marginal benefits may decline when used more extensively (Rawdanowicz et al., 2013).

- *Quantitative easing.* Additional QE programmes are likely to have diminishing effects on long-term interest rates when prices of securities are already elevated. Moreover, marginal changes in low interest rates may fail to stimulate demand, but they can instead lead to increasing risk-taking as investors intensify the search for yield. Ultimately, ensuing asset price booms may jeopardise financial stability (Rajan, 2013). Low interest rates may also inhibit resource allocation, with negative implications for future growth, by reducing incentives to restructure financial and non-financial corporates (Goodhart and Ashworth, 2012). They may also encourage non-financial corporations to buy back their shares instead of financing investment in productive capacities (Stein, 2012b). Protracted QE programmes may result in the dominant position of the central bank in specific security markets, distorting price signals and market discipline. A low-interest rate environment may also discourage governments from undertaking necessary fiscal and structural reforms (Berganza et al., 2014). Long-lasting QE may increase wealth inequality as capital gains will disproportionately accrue to few wealthy households with large financial assets. Consequently, wealth effects could fail to boost consumption as wealthy households have a low propensity to consume. Finally, ever-larger central bank assets will complicate the exit strategy. This includes risks of capital losses on assets that could undermine central banks' independence (Cobham, 2012; Box 2). Risks to inflation expectations could also arise if QE were seen as government debt monetisation (Box 2).
- *Incentivised lending schemes to encourage bank lending.* These schemes risk postponing the needed restructuring in the banking and non-financial sectors, by supporting zombie banks and enterprises. In addition, if the schemes target loans only to selected sectors, as in the first programme implemented in Japan (Annex 4), their effect for the total economy will be limited and they become more of an industrial policy tool which may raise concerns about resource misallocation and fairness.

Given the risks to financial stability, enhanced prudential measures would be a desired complement to more QE. They could offset some of these risks but there are limits to their effectiveness and it is doubtful if they can counter a generalised rise in risk-taking. Besides, tightening regulation for commercial banks can result in regular bank activities migrating to lightly regulated shadow banks. It would be also essential to clean bank balance sheets to maximise the effectiveness of unconventional measures as this would improve the transmission.

As QE programmes involve moral hazard for governments, reducing incentives to consolidate public finances and implement structural reforms, they may be made conditional on progress in these two areas. This has not been done yet. However, such a strategy would require a good understanding of the quantitative impact of monetary, fiscal and structural policies, which is inherently difficult to assess. Such conditionality would also complicate interactions between an independent central bank and an elected government as the bank would be implicitly imposing policies on the government. In the euro area, conditionality is envisaged in OMT (Sections 3 and 5.9) but it may be more difficult to use it for QE involving purchase of government bonds of all euro area member states, including those not being subject to an EFSF/ESM programme.

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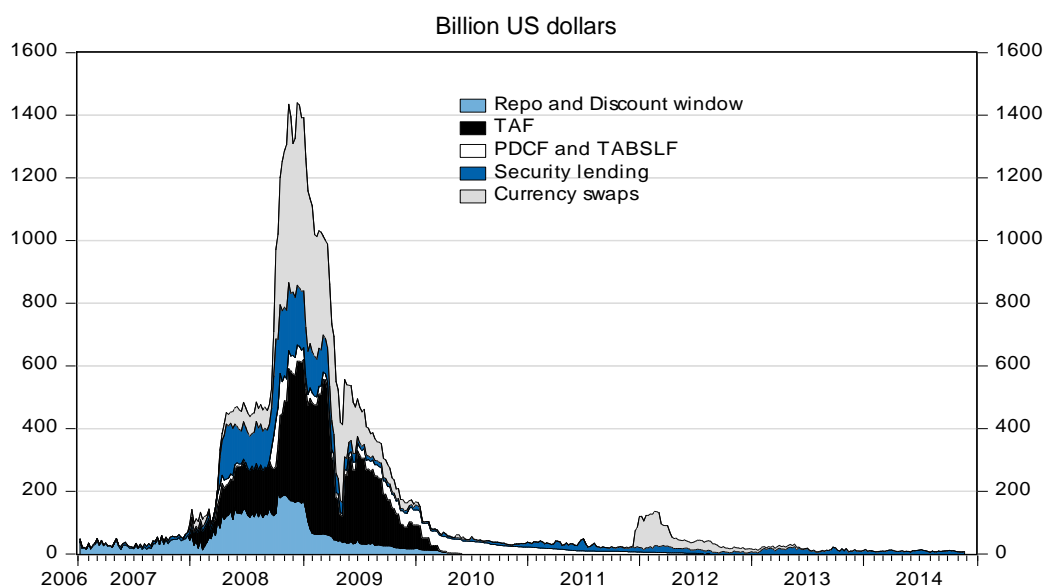
## ANNEX 1. CRISIS-RELATED LIQUIDITY PROVISION MEASURES

During the crisis central banks expanded the list of eligible collateral, increased the number of counterparties, and lengthened the maturity of facilities they offered (as outlined in Table 2 of the main text and in Table A1.2). This annex provides details on specific measures carried out in the United States, the euro area, Japan and the United Kingdom, as well as bilateral currency swap lines.

### United States

The Fed's initial liquidity response to the crisis was directed at depository institutions (Figure A1.1 and Table A1.1). Special liquidity provisions were subsequently made available to a wider set of financial institutions and particular security markets (like asset-backed securities and commercial paper issued by non-financial companies investing in securitised products). They involved setting up new temporary facilities from which primary dealers and money market funds could borrow against collateral, purchases of securities, and provision of non-recourse loans to investors in securitised products. The Fed also intervened in particular asset markets.

**Figure A1.1. Fed's liquidity facilities**



Note: TAF is Term Auction Facility; PDCF is Primary Dealer Credit Facility; and TABSLF is Term Asset-Backed Securities Loan Facility.

Source: US Federal Reserve.

**Table A1.1. US crisis-related liquidity provision measures**

Measure	Date introduced	Date of expiry	Remarks
Discount Window Lending extended to 30 days	August 2007	March 2010	The typical maximum maturity was extended, and then reduced to overnight in 2010.
Term Auction Facility	December 2007	March 2010	Allowed depository institutions to obtain four-week and 12-week credit.
Term Securities Facility	March 2008	February 2010	The Fed loaned Treasury securities for four weeks to primary dealers in exchange of eligible agency bonds and AMBS.
Primary Dealer Credit Facility	March 2008	February 2010	Enabled primary dealers to borrow money against Treasury securities, agency bonds and AMBS from the Fed for the first time.
Asset-Backed Commercial Paper (ABCP) Money Market Mutual Fund Liquidity Facility	September 2008	February 2010	Helped financial institutions to raise funds to purchase ABCPs from money market funds without limits.
Commercial Paper Funding Facility	October 2008	February 2010	A special purpose vehicle financed by the Federal Reserve Bank of New York (FRBNY) which purchased directly three-month commercial papers, including ABS, from issuers, without limits.
Money Market Investor Funding Facility	October 2008	October 2009	The MMIFF purchased \$600 billion of short-term debt with the maturity up to three months and the highest credit-rating that were issued by financial institutions.
Term Asset-Backed Securities Loan Facility	March 2009	June 2010	The FRBNY made non-recourse loans to investors in securitised products that were collateralised by ABS and CMBS with the highest rating. The amount of loans was increased to \$1 trillion. The duration of was extended to three years.

Source: Federal Reserve and OECD compilation.

## Euro area

Prior to the crisis the ECB accepted a relatively broad range of collateral (including commercial bank loans) and had a relatively large number of counterparties, meaning there was less need for the ECB to introduce new facilities (Klyuev et al., 2009; Table A1.2). However, from August 2007, the ECB began providing extra liquidity through fine-tuning operations and also standard operations. In October 2008, the ECB further increased liquidity provision, by offering longer-term tenders (ultimately up to four years), expanded collateral eligibility and extended the list of counterparties for fine-tuning operations. It also switched to fixed-rate tender with full allotment in its main refinancing operations.

- Since 2007 the composition of various types of collateral used remained stable (ECB, 2013). During the crisis the collateral requirements were relaxed.<sup>1</sup> For example, in October 2008 the credit threshold for marketable collateral was reduced from “A-” to “BBB-” and certificates of deposit were accepted. In November 2008, debt instruments in foreign currencies were also accepted. In January 2011, fixed-term deposits were added to the list of eligible collateral.
- The ECB continued to conduct main refinancing operations of one week maturity. The average maturity of ECB refinancing operations was extended from months to years (Claeys, 2014). The maximum maturity of LTROs was lengthened from three months, with a six month LTRO announced in March 2008, culminating with the introduction of Long-Term Refinancing Operations (LTROs) in December 2011 and February 2012 which offered financing for up to three years. In June 2014, the ECB announced Targeted Longer-Term Refinancing Operations that offered financing to banks for up to 4 years, conditional on meeting bank lending benchmarks (Annex 4).
- In October 2008, the list of counterparties eligible for fine-tuning operations (which had been more restrictive) was expanded to include those eligible for Eurosystem open market operations.
- In October 2008, the ECB moved from auctions to full allotment (at a fixed rate) for MROs, LTROs and fine-tuning operations. In effect, the ECB replaced the money market (Giannone et al., 2012). Main refinancing operations and long-term refinancing operations meant that banks had unlimited access to central bank liquidity if they had sufficient collateral.

## Japan

The BoJ’s initial response to the crisis was to help private banks to raise US dollar funds. In September 2008, the BoJ introduced the US Dollar Funds-Supplying Operation collateralised by domestic securities.

The BoJ also facilitated corporate financing and purchased commercial papers. In January 2009, the BoJ introduced the Money Market Operation Measures to Facilitate Corporate Financing via which it supplied short-term funds to financial institutions collateralised with eligible claims on corporates. It also started purchasing commercial paper (including ABS and with credit ratings of at least “A”), amounting to 3 trillion yen (0.6% of GDP). In February 2009, the BoJ began purchasing corporate bonds with the maturity of up to one year and credit rating of at least “A”, which totalled 1 trillion yen (0.2% of GDP). All of these measures were motivated by increased demand for liquidity by businesses related to payments at the end of a fiscal year.

The BoJ’s crisis-related liquidity measures focused on traditional counterparties, but involved relaxing collateral eligibility (Table A1.2) by accepting real estate investment trusts’ debt (January 2009), government-guaranteed commercial papers (February 2009), loans to government and loans with a government guarantee (April 2009), and selected foreign government bonds (May 2009).<sup>2</sup>

## United Kingdom

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1. A thorough review of changes to the ECBs collateral rules is given in ECB (2013).
  2. Government bonds of the United States, the United Kingdom, Germany and France.

The BoE had traditionally been very restrictive regarding collateral eligibility, only accepting highly liquid government bonds as collateral (Cheun et al., 2009), but in response to the crisis it broadened the range of collateral it would accept (Table A1.2). Other measures included increasing the number of counterparties and allowing financial institutions to swap less liquid assets for BoE's liquid assets. The BoE also abandoned short-term repos as they had become redundant due to QE and long-term repos.

Changes to collateral rules included:

- In September 2007, the BoE offered to accept private sector securities such as AAA-rated residential mortgage-backed securities (RMBS) at 1 percentage point above the Bank rate in a special term auction, but it was not used by banks due to stigma effects.
- At the end of 2007, collateral for long-term repo operations was extended to include “own issued” ABSs and RMBSs, and securities denominated in most major currencies could be used.
- In October and December 2008, eligible collateral was expanded again for long-term repo operations to include commercial mortgage-backed securities (CMBS), corporate debt, government guaranteed bank debt and covered bonds. Expanded collateral for long-term repos was made permanent. The Discount Window Facility was also modified to allow a much wider range of collateral. The same collateral eligibility criteria are used for long-term repos and the Discount Window Facility, but operational standing facilities had a narrower collateral requirement.
- In April 2008, the Special Liquidity Scheme was also introduced to allow banks to borrow liquid assets from the BoE in exchange for less liquid assets.

The maturities for the Discount Window Facility and open market operations also increased (Klyuev, 2009). Gradually, over 2007 long-term repos were used more. The BoE abandoned Short-Term Repos in August 2009 as a sufficient supply of reserves was provided via asset purchases and long-term operations, such as (three to 12-months) Long-Term Repos (Bank of England, 2014). In February 2009, the maturity for the Discount Window Facility was increased from 30 up to 364 days.

In October 2009, the number of institutions eligible to apply for reserve accounts, and therefore standing facilities, was expanded, from those with eligible liabilities of 500 million sterling, to all those that report their eligible liabilities to the BoE.

In December 2011, the BoE also set up the Contingent Term Repo Facility (until 2014 called the Extended Collateral Term Repo). It is a dormant facility that the BoE can activate in a time of market stress. It allows for borrowing against the full range of collateral accepted by the BoE.

### **Currency swap lines**

Several central banks arranged bilateral currency swap lines to meet increased demand for liquidity in US dollars. In December 2007, the Fed first set up swap lines with the ECB and the SNB and, in September and October 2008, with central banks in other selected advanced and emerging market economies (Australia, Brazil, Canada, Denmark, Japan, Mexico, New Zealand, Norway, Singapore, South Korea, Sweden and the United Kingdom). In the last quarter of 2008, nearly \$600 billion dollars were loaned by the US Fed in swap agreements (Figure A1.1 and Table A2.1 in Annex 2). These temporary bilateral liquidity swap lines among the BoC, the BoE, the BoJ, the ECB, the Fed and the SNB were converted to standing arrangements in October 2013.

**Table A1.2. Selected characteristics of open market operations and standing facilities**

	Fed			ECB			BoJ			BoE		
	Jun-07	Jun-09	Dec-14	Jun-07	Jun-09	Dec-14	Jun-07	Jun-09	Dec-14	Jun-07	Jun-09	Dec-14
<b>Open market operations</b>												
Frequency of offering main facilities <sup>1</sup>	Flexible	Flexible	Flexible	W, M	W, M	W, M	Flexible	Flexible	Flexible	W, M	W, M	M
Maturity	1D to 2W	1D to 2W, 4W, 3M	1D to 2W	1W and 3M	1W, 3M <sup>2</sup>	1W, 3M <sup>3</sup>	1D to 1Y	1D to 1Y	1D to 1Y	1W, 3M-1Y	1W, 3M-1Y	6M
Full allotment					✓	✓						
<b>Standing facilities</b>												
Marginal lending facility: maturity <sup>4</sup>	1D	90D	1D	1D	1D	1D	1D	1D	1D	1D	1D	1D
Deposit facility: Term deposit			1D to 12W			1W						
<b>Eligible collateral assets<sup>5</sup></b>												
Public bonds	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ABS/ABCP	✓ <sup>6</sup>	✓	✓ <sup>6</sup>		✓	✓	✓	✓✓	✓✓		✓	✓
Corporate bonds		✓		✓	✓	✓	✓	✓✓	✓✓		✓	✓
Required minimum credit ratings		BBB		A-	BBB-	BBB-	A	BBB	BBB		A-	A-
Foreign government bonds		✓		✓	✓	✓		✓	✓	✓	✓	✓
Non-marketable assets		✓		✓	✓	✓	✓	✓✓	✓✓		✓	✓
<b>Eligible counterparties<sup>5,7</sup></b>												
Deposit takers		✓		✓	✓	✓ <sup>8</sup>	✓	✓	✓ <sup>8</sup>	✓	✓	✓
Securities companies, bond & money markets dealers <sup>9</sup>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓✓
Non-bank financial institutions and others		✓	✓ <sup>10</sup>									

- For the ECB, this refers to Main Refinancing Operations (MRO) and Long-term Refinancing Operations (LTRO).
- Operations with maturities of 6 months to 3 years were also undertaken.
- Special 4-year TLTROs were also conducted.
- For the Fed, this refers to primary credit.
- Eligibility for standard market operations and temporal lending facilities in the crisis, not for permanent standing facilities. ✓✓ means additional relaxations of eligibility.
- For the Fed, this refers to agency MBS.
- Excluding purchases of long-term securities.
- Including European Investment Bank since May 2009 and Development Bank of Japan since December 2008.
- For the Fed, this refers to primary dealers, while for the ECB this refers to financial institutions subject to reserve requirements.
- For reverse repos.

Note: D stands for daily, W stands for weekly, M stands for monthly, and Y stands for yearly.

Source: Bank of England, Bank of Japan, European Central Bank, US Federal Reserve, and OECD compilation.

## ANNEX 2. QUANTITATIVE EASING

This annex discusses quantitative easing (QE) measures implemented by major central banks since the beginning of the recent global financial crisis and their potential positive effects.

Quantitative easing measures have been increasingly used as a substitute for policy rate cuts to boost demand.<sup>1</sup> Central banks have expanded balance sheets by purchasing long-term high-quality securities in secondary markets (Tables A2.1-4). QE has been used mainly in Japan, the United Kingdom and the United States. The composition of purchased assets has differed somewhat. In Japan and the United Kingdom, longer-term government bonds accounted for the majority of central bank purchases, while in the United States only for around 60%. As a result of these purchases, the three central banks hold between 20% and 35% of outstanding government debt. Private assets purchases in the United States comprised primarily mortgage-backed securities. In Japan, they included investment-grade corporate bonds, commercial paper and risky assets in Exchange-Traded Funds and Japanese Real Estate Investment Trusts. In the euro area, QE programmes initially were on a considerably smaller scale though they are now to be expanded. The ECB purchased small amounts of covered bonds, and recently has restarted covered bond purchases and initiated purchases of asset-backed securities and, in January 2015, announced open-ended purchases of public and private sector securities of €60 billion per month (0.6% of GDP), starting in March.<sup>2</sup>

The purpose of QE measures is to boost economic activity by lowering long-term interest rates, raising asset prices and inflation expectations via various channels:

- *Lowering yields of purchased assets.* This could stem from direct effects due to increased demand that compresses liquidity and term premia as, thanks to QE, it would be easier for investors to sell assets and they would face lower duration risks by holding securities of shorter maturities.
- *Signalling future monetary policy.* A central bank engaging in QE signals accommodative policies for long. This could contribute to lower expected interest rates and be reflected in current

- 
1. QE was initiated in Japan before the crisis. Between 2001 and 2006, the BoJ purchased short-term high-quality assets to boost monetary base from 5 trillion yen to 30-35 trillion yen (around 6.5% of GDP) to facilitate liquidity management of financial institutions. Similarly, after the outburst of the global financial crisis, QE measures in some countries were initially motivated by liquidity provision (Annex 1).
  2. Two initial covered bond programmes resulted in purchases of €100 billion (1% of GDP), and between October 2014 and January 2015 the ECB bought €37.2 billion of covered bonds and €2.3 billion of ABS securities. In 2012, the ECB bought also Greek, Irish, Italian, Spanish, Portuguese and Spanish long-term government bonds under the Securities Markets Programme (around €220 billion, 2.3% of euro area GDP). Government bond purchases aimed at improving monetary policy transmission and not expanding balance sheets per se and until June 2014, the ECB sterilised these purchases via one-week deposit facility. On top of the covered bonds and ABS securities, open-ended monthly purchases are to include euro-denominated investment-grade securities issued by euro area governments and agencies and European institutions in the secondary market.

nominal long-term interest rates but also lead to higher inflation expectations. Such effects could be stronger when combined with forward guidance (Annex 3).

- *Portfolio rebalancing.* With imperfect asset substitutability, central bank's purchases of longer-term securities encourage private investors to rebalance their portfolios towards other longer-term securities or riskier assets, given their maturity preferences or search for yield.
- *Exchange rate channel.* QE could lead to exchange rate depreciation as it usually signals sustained accommodative monetary policy and raises inflation expectations.

Quantitative easing is generally found to have lowered long-term interest rates, but the size and duration of these effects are highly uncertain (Martin and Milas, 2012). Implications for other asset classes, real GDP growth and inflation are less researched and there is less supportive evidence. For instance, in the United States, QE together with forward guidance have stimulated real activity and inflation but the effects were limited (Engen et al., 2014). A lack of a significant impact on inflation is consistent with the limited increase in broad money supply despite the QE-induced massive expansion of monetary base. Similarly, inflation expectations are found to be unaffected by QE's in the United States and the United Kingdom (Hofmann and Zhu, 2013). The role of particular channels via which QE has affected interest rates is also far from settled. Wu (2014) finds that in the United States both signalling and portfolio rebalancing channels were important, but they related not only to QE but also to forward guidance (Annex 3). In Japan, portfolio rebalancing and exchange rate channels seem to play the main role: commercial banks reduced holdings of government bonds and increased holdings of riskier-assets (Saito et al., 2014), and the yen effective exchange rate depreciated by nearly 20% following the announcement of quantitative and qualitative monetary easing in April 2013.

**Table A2.1. Fed's balance sheet**

	27-Dec-06		31-Dec-08		31-Dec-14	
	bn US\$	share	bn US\$	share	bn US\$	share
<b>Total Assets</b>	<b>870</b>	<b>100</b>	<b>2 239</b>	<b>100</b>	<b>4 498</b>	<b>100</b>
Gold and SDRs	14	2	15	1	18	0
Securities held outright	784	90	502	22	4 425	98
Bills	277	32	18	1	0	0
Notes and bonds	502	58	457	20	2 461	55
Federal agency debt securities	0	0	20	1	39	1
Mortgage-backed securities	0	0	0	0	1 737	39
Net unamortized premiums on securities held outright	5	1	7	0	188	4
Repurchase agreements	36	4	80	4	0	0
Central bank liquidity swaps	0	0	554	25	2	0
Other assets	36	4	1 089	49	53	1
<b>Total liabilities</b>	<b>870</b>	<b>100</b>	<b>2 239</b>	<b>100</b>	<b>4 498</b>	<b>100</b>
Federal Reserve notes, net of F.R. Bank holdings	783	90	853	38	1 299	29
Reverse repurchase agreements	32	4	88	4	510	11
Term deposits held by depository institutions	0	0	0	0	0	0
Other deposits held by depository institutions	13	1	860	38	2 378	53
Other liabilities	14	2	137	6	254	6
Capital	31	4	42	2	1 255	28
<b>Memorandum</b>						
Total assets/liabilities, % of GDP	6		15		26	

Source: US Federal Reserve and OECD compilation.

Table A2.2. BoJ's balance sheet

	31-Dec-06		31-Dec-08		31-Dec-14	
	tr ¥	share	tr ¥	share	tr ¥	share
<b>Total assets</b>	<b>115.5</b>	<b>100</b>	<b>122.8</b>	<b>100</b>	<b>300.6</b>	<b>100</b>
Gold and cash	0.6	1	0.6	1	0.7	0
Receivables under resale agreements	5.3	5	14.1	11	0.0	0
Japanese government securities	80.6	70	63.1	51	253.5	84
Financing bills treasury bills and treasury discount bills	29.1	25	21.8	18	53.3	18
Japanese government bonds	51.5	45	41.3	34	200.2	67
Commercial papers	0.0	0			2.6	1
Corporate bonds					3.2	1
Pecuniary trusts	1.6	1	1.3	1	5.2	2
Loans	21.7	19	25.8	21	28.7	10
Funds-supplying operations against pooled collateral	21.7	19	25.5	21	28.7	10
Other loans	0.0	0	0.3	0	0.0	0
Foreign currency assets	5.0	4	17.3	14	5.8	2
Other assets	0.7	1	0.9	1	1.0	0
<b>Total Liabilities</b>	<b>115.5</b>	<b>100</b>	<b>122.8</b>	<b>100</b>	<b>300.6</b>	<b>100</b>
Banknotes	79.8	69	81.5	66	88.6	29
Current deposits	10.4	9	15.2	12	167.3	56
Other deposits	0.0	0	11.8	10	5.2	2
Deposits of the government	4.1	4	3.5	3	2.1	1
Payables under repurchase agreements	15.0	13	4.1	3	30.4	10
Bills sold	0.0	0	0.0	0	0.0	0
Other liabilities	0.4	0	0.9	1	0.3	0
Capital	5.7	5	5.8	5	6.7	2
<b>Memorandum</b>						
Total liabilities, % of GDP	22.8		24.5		61.7	

Source: Bank of Japan and OECD compilation.

Table A2.3. BoE's balance sheet

	27-Dec-06		31-Dec-08		24-Sep-14	
	bn £	share	bn £	share	bn £	share
<b>Total assets</b>	<b>86</b>	<b>100</b>	<b>238</b>	<b>100</b>	<b>405</b>	<b>100</b>
Short-term open market operations, of which	37	43	0	0	0	0
one week sterling	37	43	0	0	0	0
fine-tuning sterling	0	0	0	0	0	0
other maturity within-maintenance period			0	0	0	0
Long-term open market operations, of which	15	17	170	71	2	0
long-term repo					2	0
contingent term repo facility					0	0
Loan to Asset Purchase Facility					375	93
Ways and Means advances to HM government	13	16	20	8	0	0
Bonds and other securities acquired via market transactions	8	9	12	5	17	4
Other assets	13	15	36	15	11	3
<b>Total liabilities</b>	<b>86</b>	<b>100</b>	<b>238</b>	<b>100</b>	<b>405</b>	<b>100</b>
Notes in circulation	42	49	47	20	63	15
Reserves balances	20	24	49	20	290	72
Short-term open market operations, of which	0	0	81	34	0	0
one week sterling			31	13	0	0
fine-tuning sterling	0	0	0	0	0	0
other maturity within maintenance period sterling			50	21	0	0
Other liabilities	23	27	62	26	53	13
<b>Memorandum</b>						
Total liabilities/assets, % of GDP	6		16		23	

Note: The Bank of England implements its policy of QE through a subsidiary company, the Bank of England Asset Purchase Facility Fund Limited. The Bank of England's spending on quantitative easing is recorded as loan to this subsidiary.

Source: Bank of England and OECD compilation.



Table A2.4. ECB's balance sheet

	31-Dec-06		31-Dec-08		31-Dec-14	
	bn €	share	bn €	share	bn €	share
<b>Total assets</b>	<b>1 151</b>	<b>100</b>	<b>2 043</b>	<b>100</b>	<b>2 150</b>	<b>100</b>
Gold	177	15	220	11	335	16
Lending to EA credit institutions related to monetary policy operations	451	39	843	41	592	28
Main refinancing operation	330	29	224	11	119	6
Longer-term refinancing operations	120	10	617	30	473	22
Fine-tuning reverse operations (assets)	0	0	0	0	0	0
Structural reverse operations	0	0	0	0	0	0
Marginal lending facility	0	0	2	0	0	0
Credits related to marginal calls	0	0	0	0	0	0
Securities held for monetary policy purposes	0	0	0	0	217	10
Other securities	0	0	0	0	371	17
Other assets	524	45	981	48	636	30
<b>Total liabilities</b>	<b>1 151</b>	<b>100</b>	<b>2 043</b>	<b>100</b>	<b>2 150</b>	<b>100</b>
Banknotes	628	55	765	37	1 017	47
Liabilities to EA credit institutions related to monetary policy operations	174	15	456	22	300	14
Current accounts (covering the minimum reserves system)	173	15	226	11	256	12
Deposit facility	1	0	230	11	44	2
Fixed-term deposits	0	0	0	0	0	0
Fine tuning reverse operations (liabilities)	0	0	0	0	0	0
Deposits related to margin calls	0	0	0	0	0	0
Other liabilities to euro area credit institutions denominated in euro	0	0	0	0	5	0
Debt certificates issued	0	0	0	0	0	0
Revaluation accounts	122	11	169	8	316	15
Other liabilities	162	14	582	28	419	19
Capital and reserves	65	6	72	4	94	4
<b>Memorandum</b>						
Total assets/liabilities, % of GDP	13		21		21	

Source: European Central Bank and OECD compilation.

### ANNEX 3. FORWARD GUIDANCE

This annex reviews recent forward guidance adopted by central banks in OECD countries and discusses its effectiveness.

Forward guidance signals the likely future path of interest rates or any other policy measure. Since the beginning of the crisis, various forms of forward guidance have been used to address constraints implied by the lower bound of the policy rate and to clarify policy reaction functions.

- Japan used forward guidance already in 1999.<sup>1</sup> Since the beginning of the crisis, the guidance focused on QE. Between October 2010 and April 2013, the BoJ first used qualitative forward guidance (referring to price stability in sight) and then replaced with quantitative guidance by referring to inflation rate thresholds: 1% in February 2012 and 2% in January 2013. This forward guidance also referred to maintaining low policy interest rates. Since the introduction of quantitative and qualitative monetary easing in April 2013, the BoJ has committed to continue the policy in an open-ended fashion until the 2% inflation target was achieved in a stable manner at the earliest possible time, with a time horizon of about two years. Thus, the guidance was both calendar-based and quantitative (Filardo and Hofmann, 2014).
- The BoC stated in April 2009 that it would keep the policy interest rate low until the end of the second quarter of 2010; however, the rate was raised in April 2010.
- Between December 2008 and November 2012, the Fed made a series of conditional commitments to maintain the very low policy rate for a period of time and stating that a highly accommodative policy stance was expected to remain appropriate for a considerable time after the recovery strengthens. In December 2012, forward guidance was changed by explicitly linking the duration of the exceptionally low policy rate with the conditions that the unemployment rate remained above 6.5%, inflation between one and two years ahead was projected to be no more than 2.5%, and longer-term inflation expectations continued to be well anchored. In March 2014, when the unemployment rate approached the 6.5% threshold, the Fed modified forward guidance by noting that it intended to maintain low policy rates for a considerable time after the asset purchase programmes had ended, especially if inflation remained below the target.<sup>2</sup> Subsequently, in December 2014, the Fed modified the language and indicated that it could be patient in beginning

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1. The first use of forward guidance in such a context was by the BoJ. In April 1999, the BoJ provided qualitative forward guidance, indicating that it would sustain the zero rate policy until deflationary concerns were dispelled. This continued until August 2000. Since 2001, the BoJ has used forward guidance on QE programmes. In the first phase of QE, between March 2001 and March 2006, the BoJ committed to continuing the policy until the annual inflation rate became positive in a stable manner.
  2. The Fed indicated that in determining how long to maintain low interest rates it would assess realised and expected progress toward its objectives of maximum employment and 2% inflation, by looking at a wide range of economic and financial indicators.

to normalise the monetary policy stance. Consequently, the character of forward guidance became again calendar-based. The Fed also applied forward guidance to its QE measures by committing to continue purchasing mortgage-backed and Treasury securities until the outlook for the labour market improved substantially.

- The BoE came out with forward guidance in August 2013, implying that the policy rate would not be raised and the stock of purchased assets be maintained at least until the unemployment rate has fallen to 7%, subject to three “knockouts” related to price and financial stability.<sup>3</sup> This guidance was modified in February 2014, as the unemployment rate threshold was expected to be reached soon. The BoE provided guidance for after the unemployment threshold had been met and stated that there remained scope to absorb spare capacity further before raising the policy rate and that the appropriate path to a normal rate was expected to be gradual, though the actual path would depend on economic developments.
- In July 2013, the ECB provided forward guidance, indicating that the policy rates would remain at present or lower levels for an extended period of time. It repeated this guidance in subsequent statements.
- Since 2007, the Riksbank has published forecasts of its own interest rate path. For example the April 2009 forecast showed the Riksbank expected the policy rate to remain at a low level until the beginning of 2011, and the December 2014 forecast implied a zero interest rate out to the second half of 2016.

The effectiveness of forward guidance in the presence of the zero lower interest rate bound depends on how market expectations respond to central bank announcements. If market participants perceive that there are few costs for central banks from reneging on their commitments or expect that the low policy rate would continue for only a relatively short period of time, it is difficult to make forward guidance fully credible and powerful as the commitment risks being time inconsistent.

The assessment of forward guidance is challenging due to the difficulties of identifying all the different factors that affect market interest rates and the difficulty of designing appropriate counterfactuals. For instance, lower interest rates after the announcement of forward guidance may reflect expectations of weaker GDP growth and inflation rather than a belief that policy rates are going to be held at extremely low levels for longer than previously thought. Indeed, some studies emphasise that the extent to which forward guidance improves central banks’ control over long-term interest rates is weak (Moessner and Nelson, 2008; Andersson and Hoffman, 2010). Several event studies find, however, support for the role of forward guidance in lowering short and long-term interest rates in the United States (Williams, 2011; and Campbell et al., 2012). Similarly, following the BoC’s announcement in April 2009, market interest rates in Canada were found to be lower than implied by econometric models estimated over the pre-announcement period (He, 2010). Recent empirical research surveyed in Berganza et al. (2014) also suggests that Fed’s and BoE’s forward guidance introduced together with QE have likely lowered the volatility of future policy rates and reduced short and long-term interest rates. This was especially the case in the United States where calendar-based forward guidance signalled deviations from the past Fed’s reaction function (Raskin, 2013).

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3. These knockouts are: 1) the MPC considers it probable that CPI inflation 18 to 24 months ahead will exceed the 2% target by at least 0.5 percentage point; 2) medium-term inflation expectations no longer remain sufficiently well anchored; 3) the Financial Policy Committee judges that the stance of monetary policy poses a significant threat to financial stability that cannot be addressed by the authorities responsible for financial stability.

## ANNEX 4. INCENTIVISED LENDING SCHEMES TO ENCOURAGE BANK LENDING

This annex discusses incentivised lending schemes to encourage bank lending in Japan, Sweden, the United Kingdom and the euro area.

### Japan

The BoJ established two kinds of special lending facilities that will expire in June 2016:

- *Growth-Supporting Funding Facilities (GSFF)*. The GSFF was established in June 2010 with the aim to strengthen growth fundamentals, and was modified in February 2014 and January 2015. It consists of four facilities. The main sub-facility has a credit line of 10 trillion yen (2.0% of GDP) and allows private banks to obtain collateralised four-year loans up to 2 trillion yen per bank at fixed 0.1% per annum. Its outstanding loan balance was 3.7 trillion yen in September 2014. This main sub-facility supports only specific projects within 18 business purposes and domains identified by the BoJ as growth promoting. Thus, such a facility has a character of industrial policy and risks distorting an efficient allocation of capital in the economy.
- *Stimulating Bank Lending Facility (SBLF)*. The facility was established in December 2012 and modified in February 2014 and January 2015. Under the SBLF, private banks can obtain collateralised four-year loans at fixed 0.1% per annum. With the SBLF, the BoJ aims at stimulating bank lending in general and sets the maximum loan to each borrower to be twice as much as the net increase in its lending. As of September 2014, SBLF lending was 15.9 trillion yen (3.3% of GDP).

### Sweden

In October 2008, the Riksbank announced a credit facility which was only open to banks that bought newly issued commercial papers. The aim of the scheme was to improve the supply of loans to the non-financial corporate sector. However, by February 2009 the Riksbank announced that such lending had not been as extensive as expected.

### United Kingdom

The BoE introduced the Funding for Lending Scheme (FLS) in July 2012. It involves swapping less liquid collateral, including loans, held by banks and building societies that sign up to the FLS (subject to a haircut) in exchange for nine-month UK Treasury bills for up to four years. The FLS is open to any bank or building society that participates in the Bank's Sterling Monetary Framework and has signed up to the Discount Window Facility, and does not involve any precondition regarding past or future credit growth. A financial institution could claim UK Treasury bills until the end of January 2014 by up to 5% of the end-June 2012 stock of existing loans to the non-financial sector, plus the amount of net increases in loans until the end of 2013. Participating institutions borrowing the Treasury bills pay an annual fee which ranges linearly from 0.25% (for institutions which maintain or increase their lending volume) to 1.5% (for institutions which reduce their lending volume by 5% or more). In April 2013, the FLS was extended by one year, and again in December 2014, allowing participants to borrow until January 2016. In November

2013, the FLS was refocused towards lending to small and medium-sized enterprises, starting in January 2014, by removing incentives to expand household lending.

For banks that maintain or expand their credit and use the Treasury bills to borrow funds at close to the expected path of the Bank rate, the marginal funding cost was expected to fall by 100 to 200 basis points (Bank of England, 2012). Thus, the FLS provides an incentive to raise loans. Loans issued under FLS do not require additional regulatory capital. In essence, the scheme provides banks with the possibility to obtain secured longer-term financing at low cost. In the third quarter of 2014, only 11 out of 38 participating groups swapped collateral, to the total tune of £2 billion; taking total outstanding drawings to £47.6 billion.

### **Euro area**

In June 2014, the ECB has announced targeted longer-term refinancing operations (TLTROs). TLTROs offer up to 4-year funding to banks with the aim to boost their lending to the private sector, excluding mortgages. Banks are entitled to borrow up to around €400 billion (4% of GDP) to end-2014. In addition, between March 2015 and June 2016, banks can borrow up to three times their net lending in excess of specified undemanding benchmarks. For banks that had positive eligible net lending in the year to April 2014, the benchmark is set at zero. For the remaining banks, until April 2015 benchmarks will follow the trend based on the (negative) average monthly net lending of each bank in the year to April 2014, and then until April 2016 they will be set at zero. This implies that banks can access TLTROs funding even if they reduce net lending initially but at a slower rate than in the year to April 2014. All TLTROs will mature in September 2018, but banks may make earlier repayments after two years. Banks that borrow TLTRO funds and fail to achieve their benchmarks by end-April 2016 will be required to pay back borrowed funds in full in September 2016. The interest rate on borrowing in the TLTROs will be fixed over the life of each operation at the ECB's main refinancing rate prevailing at the time of take-up augmented by a fixed spread of 10 basis points.

Market initial estimates indicated that the overall take-up could be between €450 billion (4.5% of GDP) and €850 billion (8.5% of GDP). However, the first auction in September and the second auction in December 2014 were well below market expectations, amounting cumulatively to €212.4 billion (2% of GDP).

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