

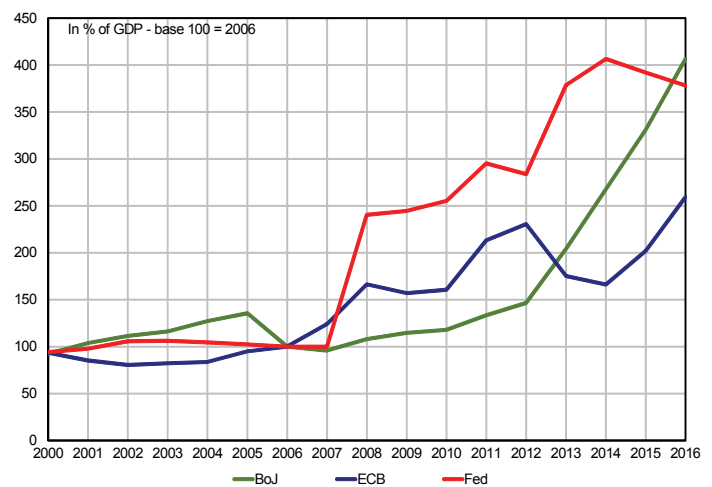
Trésor-economics

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The size of central bank balance sheets: a new monetary policy instrument

- Since the 2008/2009 crisis, the central banks of advanced countries have significantly expanded their balance sheets - not least through asset purchase programmes. With the economic situation improving, the question now turns to possibly reducing balance sheets - beginning in the US - and the economic effects of such a move.
- In October 2017, the US Federal Reserve started reducing its balance sheet. In parallel, the Fed continues to raise its key rates gradually. In the euro area, the European Central Bank is still expanding its balance sheet - albeit at a slower pace.
- Managing the size of the balance sheet has become a monetary policy instrument in its own right, alongside key interest rates. This development is notably attributable to the zero lower bound. While both instruments can be used to pursue the same objectives (price stability and full employment), they are not perfect substitutes.
- Asset purchases have a greater impact on the long end of the yield curve, whereas changes to key rates affect the short end more. Therefore, for the same impact on growth and inflation, these two instruments have different effects on the behaviour of financial and non-financial agents, the profitability of financial institutions, the cost of servicing the public debt, exchange rates and international capital flows.
- There is no consensus as to the "optimal" size of a central bank's balance sheet across the economic cycle. However, if a balance sheet is too big, there might be a shortage of eligible marketable assets in circulation, complicating the implementation of further asset purchases. Japan is apparently close to reaching this point.
- In the current context, the major central banks will have to strike the right balance between supporting the economic recovery and avoiding financial markets overheating. While the economic recovery is under way, inflation remains low. This situation will probably prompt central banks to rein in their policies very gradually. They will nevertheless be wary of growing risk-taking by financial agents, and in conjunction with prudential authorities, may seek to curtail excesses that could trigger future crises.

Size of central banks' balance sheets



Sources: ECB, Eurostat, BoJ, IHS, Fed, Reuters.

1. Central banks are using their balance sheets as a monetary policy instrument

1.1 Central banks have significantly expanded their balance sheets in the past few years

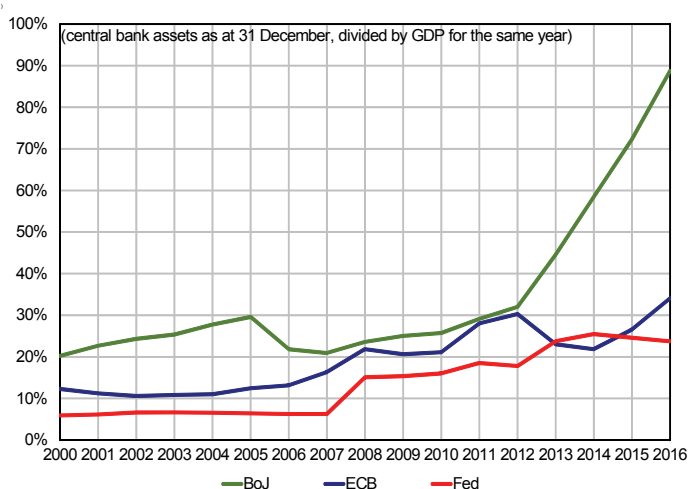
Since the 2008 financial crisis, the central banks of advanced countries have significantly expanded their balance sheet (see Chart 1). This movement has been driven by lending to banks and quantitative easing (QE) programmes aimed at boosting post-crisis economic activity and inflation, in a context of key rates close to their zero lower bound (see Chart 2).

The balance sheets of the US Federal Reserve, the European Central Bank (ECB) and the Bank of Japan (BoJ) have reached similar levels in nominal terms

(around \$4tn to \$4,5tn in 2016), but compared to the size of their relative economies, the balance sheet situation is very different. The central bank's balance sheet is equivalent to 24% of GDP in the US, 34% in the euro area, and 89% in Japan (see Chart 1).

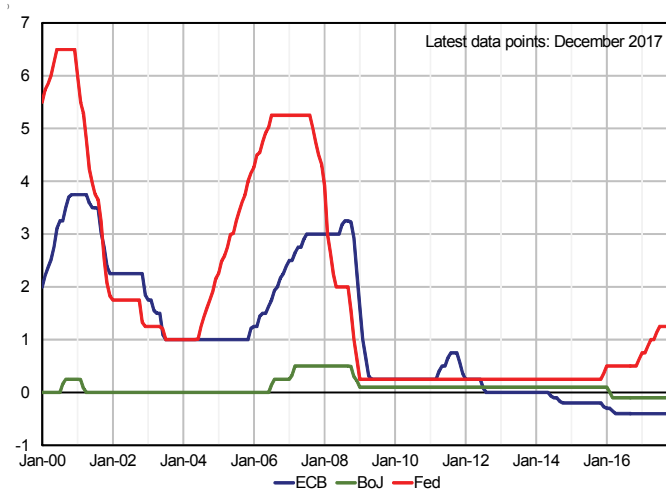
The major central banks began QE by purchasing government bonds. To a lesser extent, their programmes included other securities, such as mortgage-backed securities (MBS) in the US or investment grade corporate bonds in the euro area. On the liabilities side, this increase in central banks' assets mainly corresponded to an increase in financial institution deposits (see Charts 3 and 4).

Chart 1: Size of central banks' balance sheets (% of GDP)



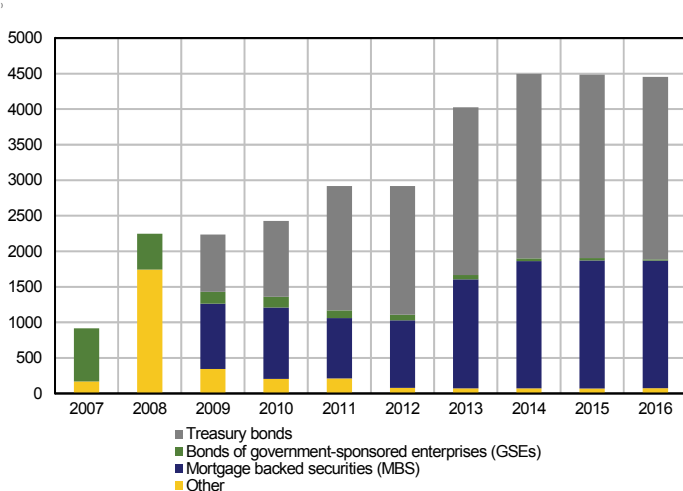
Sources: ECB, Eurostat, BoJ, IHS, Fed, Reuters.

Chart 2: Key rates



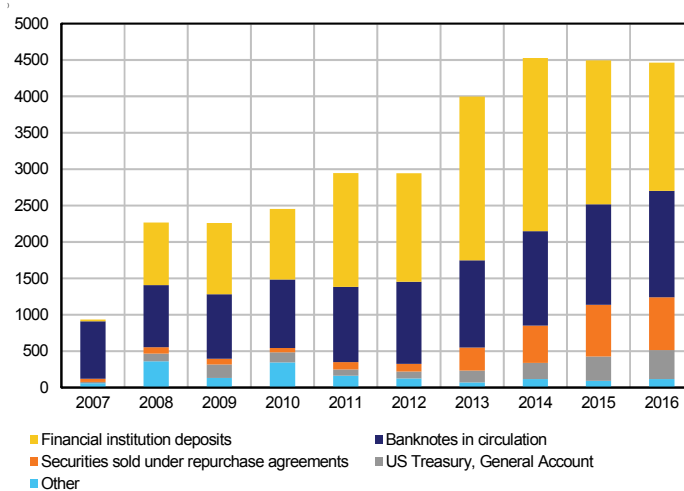
Sources: Global insight, central banks.

Chart 3: Breakdown of the Fed's assets (\$ bn)



Source: Fed.

Chart 4: Breakdown of the Fed's liabilities (\$ bn)



Source: Fed.

Purchases of sovereign bonds can support economic activity and inflation through several channels. By increasing demand for sovereign bonds, central banks' asset purchases exert downward pressure on sovereign rates. This can have a knock-on effect on the borrowing costs of companies and households, thereby boosting consumption and investment. Lower sovereign rates can also encourage investors to take on more risk in a search for yield (as returns on "safe" securities are weak); this can facilitate the financing of certain risky projects. Lastly, the reduction in long-term sovereign rates results in greater leeway for pro-growth fiscal policy.

1.2 The Fed recently started reducing its balance sheet, and other central banks could follow suit in the medium term

In the US, the Fed recently began to reduce its balance sheet. Between 2008 and 2014, it implemented three successive QE programmes. In late 2014, it halted its net asset purchases, stating that the economic recovery was robust enough for it to withdraw this supporting factor. Therefore, between late 2014 and September 2017, the Fed maintained its balance sheet at a steady level by reinvesting the proceeds from maturing assets into new asset purchases. Moreover, in late 2015, it began to raise its key rates gradually.

In October 2017, the Fed started to run down its balance sheet. Its official statements indicate that it will not renew securities as they mature rather than selling assets outright, and will even roll over a portion of maturing securities in the first few months of the normalisation period in order to prevent long-term interest rates from rising too abruptly. As such, it aims to reduce its balance sheet by a maximum \$10bn per month initially, rising to a maximum of \$50bn per month. According to the Fed's strategy, this reduction should be on "automatic pilot": the idea is to set a fixed trajectory for reducing the balance sheet, and to adjust the

trajectory for key rates over time to respond to changes in economic activity and inflation.¹

In the euro area, the ECB continues to acquire assets, but it is tapering its purchases. Between 2010 and 2012, the ECB's balance sheet expanded, notably due to its very long-term refinancing operations (VLTROs). It later contracted as these operations ended gradually from 2012 to 2014.

In March 2015, with the euro area facing the risk of deflation, the ECB launched an asset purchase programme (APP), wherein it purchased both sovereign bonds of euro area countries (proportionally to their economic weight in the currency area) and private-sector securities. Purchases initially totalled €60bn per month, rising to €80bn per month in April 2016 before reverting to €60bn per month in April 2017.

In October 2017, the ECB announced that it would scale back these purchases to €30bn per month as from January 2018, and that it would continue these purchases "until the end of September 2018, or beyond, if necessary, and in any case until the Governing Council sees a sustained adjustment in the path of inflation consistent with its inflation aim." At the same time, the ECB committed to "reinvest the principal payments from maturing securities purchased under the APP for an extended period of time after the end of its net asset purchases"; this means that the Eurosystem's balance sheet will remain quite large in the years ahead.

In Japan, the BoJ continues to expand its balance sheet, albeit at a slower pace over the past year. The BoJ is still purchasing securities as part of its Quantitative and Qualitative Monetary Easing programme launched in 2013. In September 2016, it set a target for long-term sovereign bond yields of around zero percent; this target now seems to be predominant over the previous strategy of purchasing fixed amounts of securities. In practice, purchases currently stand at some JPY50,000bn per year, compared to JPY80,000bn previously. The BoJ has committed to continue expanding its monetary base until annual inflation surpasses its 2% target on a lasting basis.

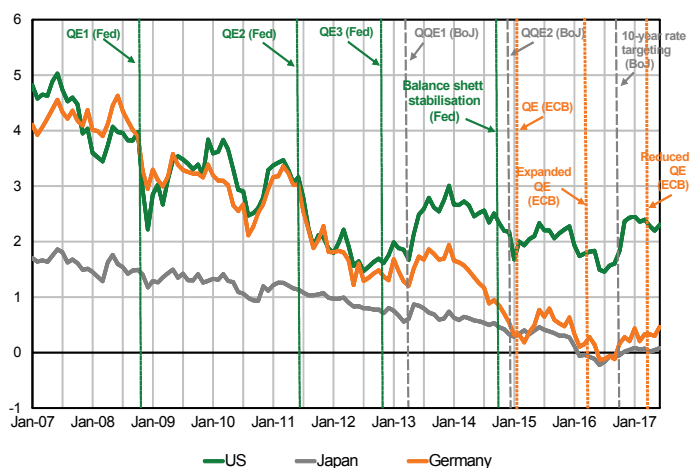
(1) One advantage of this strategy is that the economic and financial effects of changes to key rates are better known and therefore potentially less likely to destabilise markets than changes to balance sheet size. See B. Bernanke (2017), "Shrinking the Fed's balance sheet", January (blog post).

2. The economic literature is inconclusive as to the optimal size of central bank balance sheets

2.1 The effectiveness of QE is fairly consensual, prompting central banks to view balance sheet size as an instrument in its own right

Central banks' various QE announcements generally coincided with declines in long-term interest rates and, more broadly, with lower interest rates all along the yield curve (see Chart 5). However, it is difficult to quantify the magnitude of the QE effect with precision because it depends on the monetary policy expectations before the announcement (in some cases, markets may have anticipated QE and priced it into rates before the actual announcement was made).

Chart 5: Trends in 10-year sovereign rates (%) and timeline for asset purchase programmes



Sources: Reuters.

The main estimates of the impact of QE in the US between 2008 and 2014 point to a cumulative effect of around 100 basis points on US long-term rates.² In the euro area, an estimate by the ECB suggests that the APP launched in March 2015 lowered long-term euro rates by around 60

basis points, with a stronger effect in the most vulnerable countries of the currency area.³

The effects of QE on economic activity and inflation are harder to quantify and go through several channels (credit, forex rates, etc.). Nevertheless, most observers estimate that QE programmes had an overall positive effect on the economies in which they were implemented.⁴ Given the current state of knowledge, central bankers are therefore inclined to include QE as a monetary policy instrument in its own right.⁵ This is all the more true in the current context, with weak inflation⁶ and a low neutral interest rate⁷ increasing the risk that key rates reach the zero lower bound, meaning that central banks need to have an additional policy instrument on hand.

2.2 It is unclear whether there is an optimal size for the balance sheet in average over the cycle

Before the crisis, the size of central bank balance sheets varied widely in proportion to their economies. This divergence reflected, inter alia, differences in managing monetary policy operations.⁸ These differences do not seem to have had any particular consequences, which suggests that there is no "optimal" size for a central bank's balance sheet over an economic cycle. Changes to balance sheet size appear to have greater effects on economic growth than the average size itself.

However, central banks face certain constraints. In particular, their asset purchase policies may ultimately be limited by a scarcity of marketable assets.⁹ In Japan, for example, the BoJ may have to contend with a scarcity of government bonds in the medium term. The BoJ currently holds about half the stock of outstanding long-term bonds issued by the Japanese Treasury, and there is also demand

(2) See Brian Bonis, Jane Ihrig and Min Wei (2017), "The Effect of the Federal Reserve's Securities Holdings on Longer-term Interest Rates", FEDS Notes. Washington: Board of Governors of the Federal Reserve System, 20 April, <https://doi.org/10.17016/2380-7172.1977>. The estimates given by the authors are broadly consistent with (albeit somewhat lower than) the other estimates in the academic literature they refer to.

(3) See R. de Santis (2016), "Impact of the asset purchase programme on euro area government bond yields using market news", *ECB Working Paper Series*, No. 1939, July.

(4) From a theoretical standpoint, it is not necessarily a foregone conclusion that QE programmes boost economic activity and inflation, but there are reasons to believe that this is the case. For a detailed discussion, see R. Reis (2016), "Funding quantitative easing to target inflation", *CFM discussion paper series*.

(5) See Blinder et al. (2016), "Necessity as the mother of invention: monetary policy after the crisis", *NBER WP 22735*.

(6) See Y.-E. Bara, J.-P. Bernard, T. Blaize, B. Campagne, L. François and Y. Osman (2017), "What is keeping global inflation so low?" *Trésor-Economics* no. 208.

(7) See A. Jaubertie and L. Shimi (2016), "The debate on secular stagnation: a status report", *Trésor-Economics* no. 182.

(8) See, for example, B. Bernanke (September 2016), "Should the Fed keep its balance sheet large?" (blog post).

(9) Conversely, if a balance sheet is too small, the central bank could theoretically face operational difficulties implementing its monetary policy, as it would not have the leeway to set short-term rates at the desired level. However, no such difficulties were visible before the crisis, not even for the Fed, which ran a relatively smaller balance sheet at the time than the other central banks. Given the current size of central bank balance sheets, these difficulties are quite unlikely to arise.

for these securities from certain private-sector players, notably to meet prudential requirements.

In addition, central banks have to contend with the constraints they set for their asset purchases. For example, in the euro area, the Eurosystem purchases government bonds of each Member State in proportion to its stake in the ECB's share capital, and caps the proportion of a country's bonds that it is authorised to hold. Given the reduction in Germany's public debt ratio, the ECB could be constrained by the cap it has set on its purchases of German government debt, although the ECB's planned reduction in the pace of its asset purchases beginning in January 2018 lowers this risk.

Generally speaking, it would be possible to purchase (or to purchase more) private-sector debt to offset the scarcity of purchasable public debt. However, this option opens the risk of economic distortions, for example owing to the different handling of different asset classes.

Some observers also argue that QE programmes have diminishing returns depending on the size of the central bank balance sheet, but this issue is not yet clearly substantiated. This argument is based on the observation of the Fed's three successive QE programmes over the past few years. These programmes appear to have had a diminishing impact (i.e. the first programme is generally considered to have been the most effective and the third one the least). However, it is likely that the impact was more dependent on the prevailing economic and financial conditions than on the size of the Fed's balance sheet at a given moment. Overall financial conditions were less favourable when the first QE was launched, and this programme therefore helped reassure the markets more in a period of high uncertainty, whereas the following QE programmes were launched when financial liquidity was more abundant. Nevertheless, a central bank's first QE programme may have a stronger effect than successive programmes on agents' anticipations if it is seen as creating a new instrument for the central bank (i.e. paving the way for further QE programmes in the future).

The size of a central bank's balance sheet also influences the extent of profits – and losses – that the bank might make. Central banks are generally profitable: the average interest rate they receive on their assets (i.e. on the securities they hold) is usually higher than the average interest rate they pay out on their liabilities (i.e. on banks' deposits). So a larger balance sheet tends to mean higher central bank profits, and thus higher dividends for the government's budget. Yet under exceptional circumstances, a central bank can turn a loss, either because one of its counterparties faces financial difficulties or because interest rates rise rapidly (central bank assets are generally fixed rate and their liabilities variable rate¹⁰).¹¹ From an economic standpoint, such losses are not especially problematic. They are usually limited in magnitude, and central banks remain largely profitable over an economic cycle.¹² Nevertheless, if such losses were to occur, they could raise political problems – especially in the US, where central bank independence is contested in some quarters.

2.3 Recent trends suggest central bank balance sheets will remain much larger than before the 2008 crisis

The Fed's current strategy of reducing its balance sheet could bring its balance sheet down to around \$3,000bn in 2022 (vs. nearly \$4,500bn at present and around \$900bn before the crisis). However, the actual reduction may be smaller, for example, if the US economy undergoes a recession during the period (the leeway for key rate cuts to stimulate the economy remains limited). Conversely, a faster-than-expected acceleration in inflation could prompt the Fed to scale back its balance sheet more rapidly, even though so far it has suggested that key rate adjustments would be its preferred instrument for addressing inflation surprises on the upside.

All in all, it looks likely that the Fed's balance sheet will remain much larger than before the crisis. The same holds true for the ECB and the BoJ, which are not as far along as the Fed in the process of stabilising and possibly reducing their balance sheets.

(10) Central banks' liabilities notably include financial institutions' excess reserves, which are remunerated at a rate close to the short-term rate.

(11) The market value of securities held by a central bank can vary over time due to interest rate fluctuations. As central banks usually hold securities to maturity, these price fluctuations do not generally result in losses, but potential unrealised capital losses can be booked to the central bank's P&L in compliance with its accounting rules (this is not the case for the Fed or the ECB; see D. Archer and P. Moser-Boehm (2013), "Central bank finances", *BIS Papers* no. 71, April).

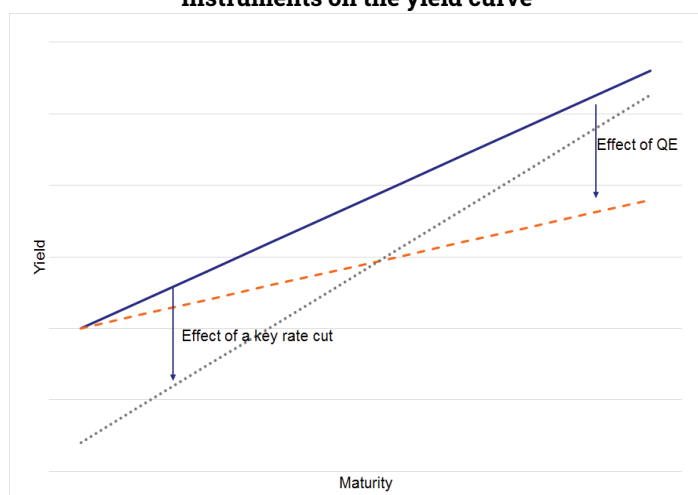
(12)) See R. Hall and R. Reis (2015), "Maintaining Central-Bank Solvency under New-Style Central Banking", *NBER Working Paper* No. 21173.

3. Interest rate policy and balance sheet policy are not perfect substitutes

Both instruments contribute to the monetary policy objectives defined by central banks, namely, price stability and (for certain central banks) full employment. Therefore, there is a certain degree of substitutability between the two instruments, even though it is difficult to say how much a key rate cut corresponds to in terms of balance sheet expansion. For instance, an estimate by the Kansas City Fed suggests that a \$675bn reduction in the Fed's balance sheet would be equivalent to a 25bp rate hike.¹³

Yet each instrument works in a different way, acting on a different segment of the yield curve. Changes to key rates tend to affect front end more than the back end of the yield curve, whereas asset purchases (which generally involve long-term government bonds) have a greater impact on long-term rates than short-term rates (see Chart 6). This gives rise to a few differences in terms of economic impact. In other words, for a given effect on economic activity and inflation, the two instruments will not necessarily produce the same effects on other variables.

Chart 6: Illustration of the effects of monetary policy instruments on the yield curve



Source: DG Trésor.

3.1 In theory, cuts in key rates are better for banks' profitability than asset purchases

The yield curve slope (i.e. the difference between short-term and long-term interest rates) is generally regarded as an important determining factor for banks' profitability. Indeed, maturity transformation represents one of the main functions of the banking sector: a portion of banks' assets consists of long-term loans, generally remunerated at the

long-term interest rate, and a portion of their liabilities, deposits remunerated at the short-term interest rate.

By reducing long-term rates, central banks' asset purchases "flatten" the yield curve, thereby theoretically denting banks' profitability, whereas key rate cuts "steepen" the yield curve. Yet things can be more complicated in reality, because banks' activities and business models are complex and diverse, and the relative effects of QE and key rate changes on other classes of assets held by banks (e.g. equities or derivatives) are not well understood.

The choice of monetary policy instruments also has an impact on the insurance sector. Life insurers generally hold substantial quantities of long-term bonds, particularly government bonds, on their asset sheets; on the liabilities side, they have commitments to savers. The reduction in bond rates has adversely affected insurers' margins, leading them to scale back returns paid to savers. This reduction in policyholder remuneration has been gradual because insurers still hold higher-yield bonds purchased when interest rates were not as low.

A rise in long-term rates would increase the yield on insurers' assets, giving them room for manoeuvre in the long term. In the shorter term, however, such a rise would trigger capital losses on the stock of bonds they hold, and could dampen remuneration for savers over a certain period of time. If the movement occurs rapidly, some savers could decide to shift their savings to new products that benefit from the higher rates of new bonds and do not have to carry the financial burden of the period of low rates.

3.2 Central bank's asset purchases also aim to encourage financial risk-taking

Another objective of QE programmes is to encourage risk-taking by financial agents. The idea is to reduce the return on "risk-free" assets (namely, government bonds or "investment grade" corporate bonds) so that investors seeking higher yields will buy riskier securities. This higher demand for risky securities then reduces the financing costs of risky companies so that they can invest more, thus supporting economic activity.

This can have consequences for financial stability: for example, a global savings glut, combined with a shortage of

(13) See A. Lee Smith and T. Davig (2017), "Forecasting the Stance of Monetary Policy under Balance Sheet Adjustments", Federal Reserve Bank of Kansas City, May.

high-yield investment opportunities and deficient prudential policies, may lead to financial bubbles on certain markets.

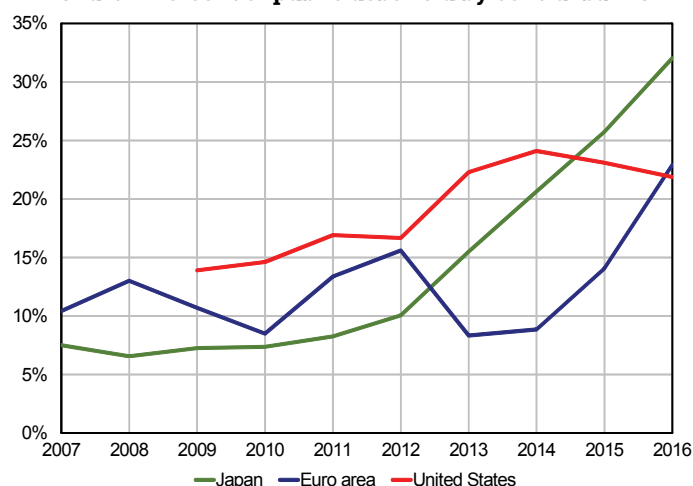
However, it is hard to determine whether, for a given macroeconomic impact, QE encourages more risk-taking – and therefore raises greater risks for financial stability – than key rate cuts. Generally speaking, the context of low short- and long-term interest rates over the past few years has encouraged economic agents in the advanced countries – especially companies – to take on more debt.

3.3 Central banks' asset purchases reduce the cost of servicing the public debt

A substantial portion of the public debt of the major advanced countries is currently held by their respective central banks (see Chart 7): more than 20% in the US and the euro area and more than 30% in Japan.

By modifying interest rates, monetary policy can have significant effects on the cost of servicing the public debt. These effects will depend both on the monetary policy instruments used (key rates or balance sheet size) and on the structure of the public debt (its maturity profile). Generally speaking, if the public debt is skewed more towards long-term maturities, the cost of servicing the debt will be affected more by QE programmes than by changes to key rates. However, these effects will take longer to materialise because long-term debt is rolled over more gradually than short-term debt. Establishing a precise comparison of the impact of both instruments (key rates and balance sheet size) would therefore require a more in-depth study that takes into account the exact structure of each country's public debt.

Chart 7: Percent of public debt held by central banks



Sources: Fed, BoJ, ECB, AMECO, DG Trésor.

A calculation for illustrative purposes suggests that a reduction in a central bank's balance sheet can have a considerable impact on the cost of servicing debt. For example, a 100bp increase in long-term US government bond yields (which, if we rely on the figures above, would be the approximate impact of the Fed's balance sheet returning to its pre-crisis level) would ultimately (i.e. after a complete rollover of public debt, taking about a decade) increase the cost of servicing US public debt by around 1 point of GDP. These magnitudes are similar for the other advanced countries. This deterioration in public finances would, however, be at least partially offset by the effects of the improved economic situation which is a prerequisite for central banks to reduce their balance sheets.

3.4 Monetary policy instruments can have different spillover effects for the rest of the world

A cut in key rates, just like expansion of a central bank's balance sheet, tends to depreciate the foreign exchange rate, but not necessarily in the same proportions. The forex rate is one of the transmission mechanisms of monetary policy. Lower short- and long-term interest rates tend to depreciate a currency, which in turn boosts economic activity and inflation. For a given effect on economic activity and inflation, key rates may have a greater effect than asset purchases on the foreign exchange rate (and thus greater international spillover effects). This is because forex rates have historically appeared more closely correlated to short-term interest rates than long-term ones. Recent statements by Lael Brainard, a member of the Federal Reserve's Board of Governors, point in this direction even though more empirical research is needed before this assumption can be confirmed or rejected.¹⁴

QE programmes have contributed to substantial capital outflows, especially towards emerging economies. Conversely, the Fed's announcement that it would "taper" its asset purchases in 2013 triggered sizeable capital outflows from certain emerging economies, with sometimes destabilising effects (the so-called "taper tantrum"). At this stage, however, it cannot be established with certainty that international capital flows are more sensitive to QE programmes than to key rate changes.

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(14) For example, the looser correlation between long-term rates and forex rates may be attributable to episodes of high risk aversion on the markets. During such episodes, the dollar tends to appreciate and US long-term rates decline, a reversal of the correlation under "normal" circumstances.

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