
Unconventional Monetary-Policy Measures

Bjarke Roed-Frederiksen and Christian Helbo Andersen, Economics

INTRODUCTION AND SUMMARY

Most central banks reduced their monetary-policy interest rates strongly during the financial crisis, to a level of zero or very close to zero in the major advanced economies. Hence the possibilities of supporting these economies by reducing interest rates had been exhausted. To prevent a lengthy period of sluggish growth and falling prices, several central banks have instead chosen to ease monetary policy by means of "unconventional monetary-policy measures". These include liquidity support such as expansion of existing lending facilities or implementation of new facilities to improve banking system liquidity. Another measure has been asset purchases. This may entail "credit easing", i.e. targeted purchases of securities in specific markets where risk premia have been pushed up to a level assessed to be out of sync with the economic fundamentals, or purchases of long-term securities in order to reduce long-term yields in general, thereby stimulating economic activity. The latter is known as quantitative easing.

This article describes the content and purposes of the various unconventional measures launched by the European Central Bank, ECB, the Bank of England, the Bank of Japan and the US Federal Reserve, followed by a description of how these initiatives are assessed to affect the financial markets and the macroeconomy. Finally, on the basis of empirical studies, the article looks at whether these measures have had the intended effects.

Most studies indicate that both the Federal Reserve's and the Bank of England's asset purchase programmes have reduced market yields, although opinions differ as to the size of the impact. At the same time, the asset purchase programmes seem to have boosted equity prices and other asset prices. The effects on the real economy are more difficult to quantify, but again many studies point to a positive impact. The ECB's liquidity support measures are assessed to have narrowed spreads between collateralised and uncollateralised money-market loans, and the ECB's purchase programmes have also helped to strengthen the efficiency of the monetary-policy transmission mechanism.

In other words, the unconventional monetary-policy initiatives have contributed to crisis management and easing of monetary policy beyond what was achievable purely by reducing monetary-policy interest rates. However, unconventional monetary policy works through other transmission mechanisms than conventional monetary policy, which may entail special costs and risks. For example, purchases in specific markets may affect relative risk premia and in the longer term distort investor decisions. This may be reflected in inappropriately risky investments and create bubbles for certain asset classes. The expansion of the central banks' balance sheets as a result of their purchases also increases the exposure to losses on the securities purchased. The purpose of the central banks' purchases of government securities has not been to finance government budget deficits and it is important that such purchases do not lead to postponement of or failure to implement the necessary fiscal consolidation. Monetary policy should generally be tightened as the economy recovers, but in view of the risks associated with unconventional measures it is particularly important to phase out these measures as the economy normalises.

VARIOUS UNCONVENTIONAL MONETARY-POLICY MEASURES

USA

The first unconventional monetary-policy initiatives from the Federal Reserve during the financial crisis were liquidity support measures. Thus, the Fed expanded its existing lending facilities and added new facilities on a current basis in 2008 and 2009, cf. Blomquist et al. (2011).

In November 2008, the Fed announced the first round of asset purchases. This programme has subsequently been referred to as QE1¹. Purchases started in January 2009 and continued, after an expansion of the programme in March 2009, until and including March 2010. In total, the Fed purchased for 1,425 billion dollars mortgage-backed securities and for 300 billion dollars long-term Treasury bonds under QE1, corresponding to approximately 12 per cent of the gross domestic product, GDP. The Fed characterised these purchases as credit easing because the aim was to support the functionality of the credit market. The purchases were targeted at the market for mortgage-backed securities, which was deemed not to be functioning optimally.

The second round of purchases, from November 2010 to June 2011, QE2, was referred to by the Fed as quantitative easing since the pur-

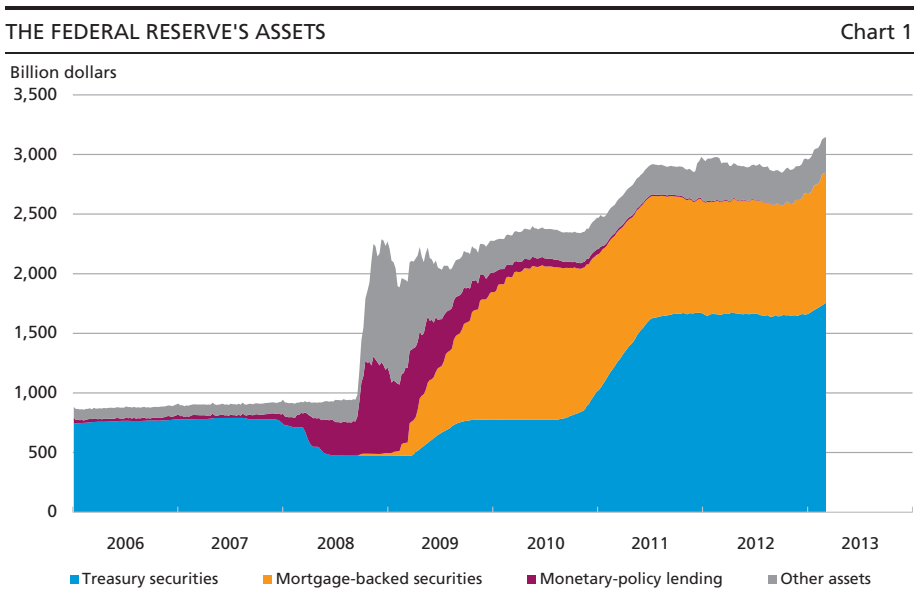
¹ Quantitative easing.

chases of long-term securities were aimed at reducing long-term yields and supporting the economy. Under QE2, the Fed purchased Treasury bonds for 600 billion dollars.

In September 2011, the Fed launched its maturity extension programme, known as Operation Twist. Until the end of 2012, the Fed purchased for 667 billion dollars Treasury bonds with maturities of 6-30 years, financed by selling bonds with maturities of less than 3 years. Once again, the purpose was to reduce long-term government yields, thereby supporting the recovery of the economy.

The most recent round of quantitative easing, QE3, was announced in September 2012 and expanded in December 2012. The Fed has announced that it will purchase mortgage-backed securities for 40 billion dollars and long-term Treasury bonds for 45 billion dollars every month. Purchases will continue until the outlook for the labour market improves substantially. The purpose is to exert downward pressure on long-term yields so as to support the economic recovery.

Due to the many unconventional monetary-policy measures, the Fed's balance sheet has increased notably, from less than 1,000 billion dollars (approximately 7 per cent of GDP) before the financial crisis to more than 3,000 billion (almost 20 per cent of GDP) today, cf. Chart 1. At the same time, its composition has changed considerably.



Note: Monetary-policy lending comprises repurchase transactions and lending via the various lending facilities. Other assets have been calculated residually.

Source: Federal Reserve.

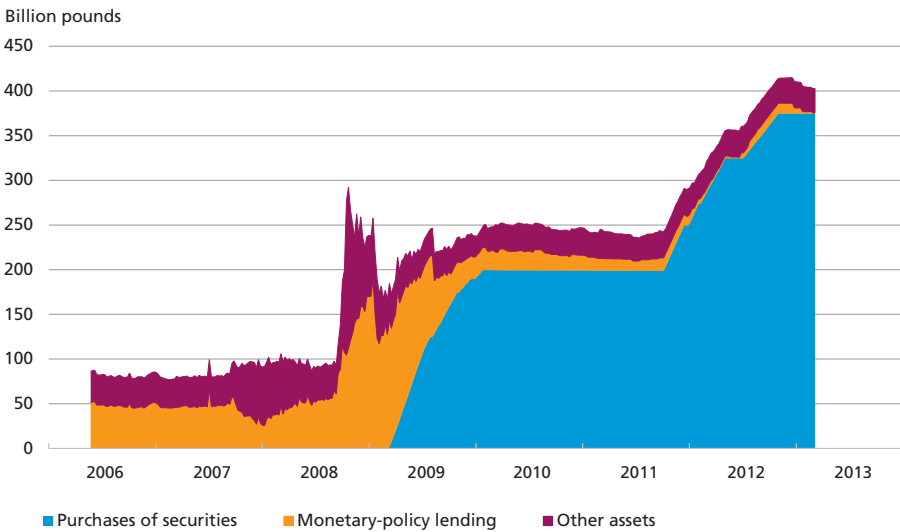
UK

The Bank of England, BoE, announced its quantitative easing programme in March 2009. Before that, the BoE had expanded several of its lending facilities. Under the asset purchase programme, the BoE purchased securities (primarily government bonds) for 200 billion pounds until November 2009. The aim was to ease monetary policy more than was possible simply by reducing the monetary-policy interest rate to a level close to zero. The programme was expanded with purchases for 75 billion pounds in October 2011, 50 billion in February 2012 and another 50 billion in July 2012. So the asset purchases, which continued until end-2012, totalled 375 billion pounds, corresponding to approximately 25 per cent of GDP, cf. Chart 2.

Besides quantitative easing, the BoE has also implemented a programme called the Funding for Lending Scheme, under which it makes inexpensive funding available to banks that increase lending to households and non-financial corporations, the aim being to encourage banks to increase their credit extension. According to the BoE, one of the reasons for this initiative is that the financial crisis has led to a surge in funding costs for UK banks and reduced credit extension to households and firms. This programme was introduced in August 2012 and runs until the end of January 2014.

THE BANK OF ENGLAND'S ASSETS

Chart 2



Note: The Bank of England's purchases are made by a fund subject to accounting separation. Hence the securities purchased are not included in the BoE's assets. Instead, the BoE's loans to the fund are included on its balance sheet. In the Chart the purchases are shown as if they were included directly on the balance sheet. Monetary-policy lending comprises short-term market operations and long-term repurchase transactions. Other assets have been calculated residually.

Source: Bank of England.

Euro area

Like the Fed and the BoE, the ECB introduced a number of measures to support liquidity during the financial crisis. For example, the ECB in October 2008 increased its liquidity-providing operations and implemented full allotment at a fixed rate of interest – instead of a fixed amount at a market-determined rate.

In May 2009, the ECB announced its first asset purchase programme, the Covered Bond Purchase Programme, CBPP, and purchased covered bonds for 60 billion euro until June 2010. In May 2010, these purchases were supplemented with the Securities Market Programme, SMP, which comprised the purchase of mainly government bonds. There was no upper limit on SMP purchases. Most of the purchases took place in May and June 2010 and again from August 2011 to January 2012. All in all, the ECB purchased for 220 billion euro under the SMP, corresponding to approximately 2.5 per cent of the euro area's GDP. Nearly half of the purchases were Italian government securities. In November 2011, the ECB introduced another Covered Bond Purchase Programme, but purchases were modest.

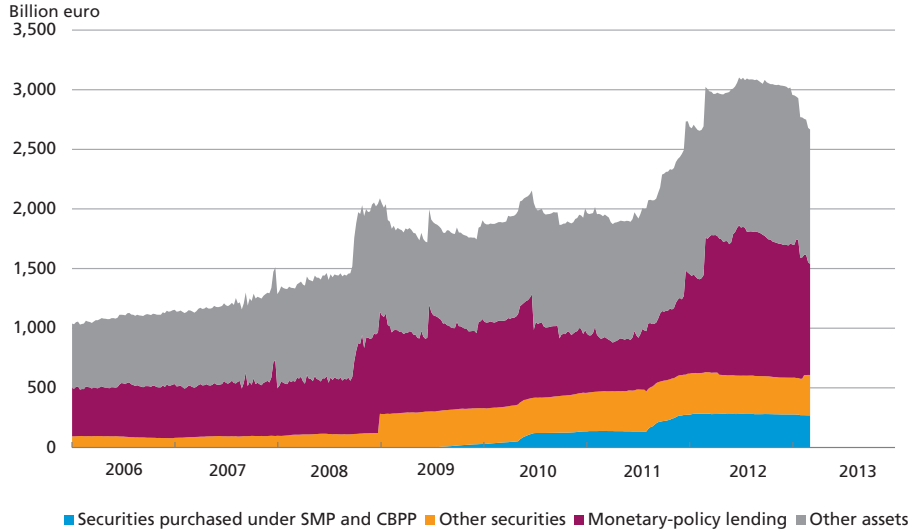
Purchases under these three programmes took place with a view to reducing market tensions that were impeding the monetary-policy transmission mechanism and thereby weakening the impact of monetary policy aimed at maintaining price stability in the medium term. In other words, the primary purpose was to ensure that the lower monetary-policy interest rates were reflected in market rates. Purchases have been limited in scope compared with both the Fed's and the BoE's purchases and the size of the markets in which purchases were made. The ECB's total purchases amount to some 3 per cent of GDP, while the Fed's purchases until 1 January 2013 constitute about 17 per cent and the BoE's around 25 per cent.

The background to the ECB's limited purchases is that the ECB to a greater extent than the two other large central banks has focused on liquidity support rather than quantitative easing, cf. Chart 3. Hence, in December 2011 and February 2012, the ECB conducted its first 3-year longer-term refinancing operations, in which the banks raised loans totalling more than 1,000 billion euro from the ECB, corresponding to more than 10 per cent of GDP.

In connection with the ECB's focus on liquidity support it should be noted that European firms to a larger extent than their US counterparts base their funding on bank loans rather than e.g. corporate bonds. At end-2007, total bank lending to the private sector amounted to 145 per cent of GDP in the euro area, but only 63 per cent of GDP in the USA, cf. Bini Smaghi (2009).

THE ECB'S ASSETS

Chart 3



Note: The Chart shows the Eurosystem's assets. The Eurosystem comprises the ECB and the national central banks of the euro area. At the end of 2008, a reclassification for accounting purposes took place, which increased the portfolio of other securities. Monetary-policy lending comprises main refinancing operations, MRO, and longer-term refinancing operations, LTRO. Other assets have been calculated residually.

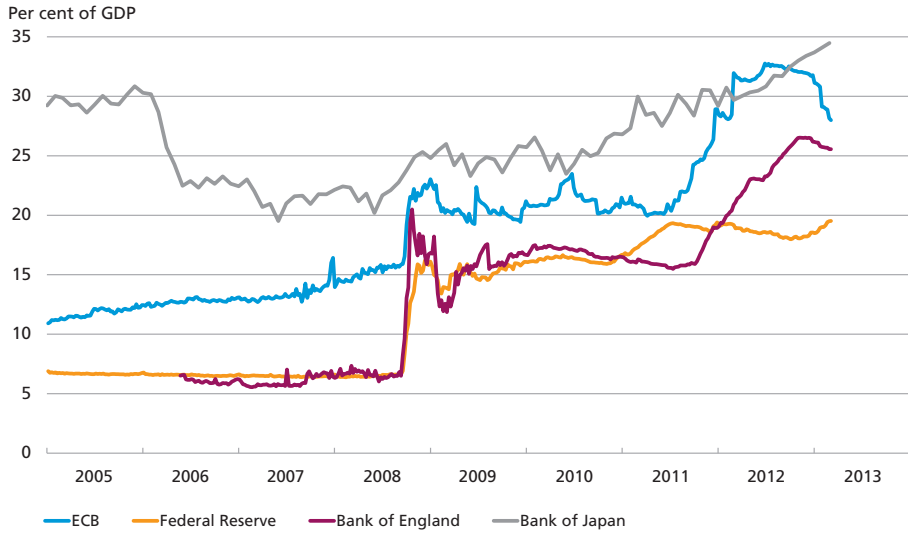
Source: ECB.

Furthermore, the EU's institutional framework plays a role. Thus, the EU Treaty bans monetary financing in the form of e.g. credit extension to European or national authorities. And unlike the Fed and the BoE, the ECB is the central bank of several countries, so asset purchases must be distributed on several countries. This raises the special issues of distribution of the purchases and potential unequal treatment of member states, cf. Bini Smaghi (2009).

In September 2012, the ECB announced a new asset purchase programme called Outright Monetary Transactions, OMT. At the same time, the SMP was formally closed. The OMT programme enables the ECB to make purchases in the secondary market of government securities with maturities of 1-3 years issued by crisis-ridden euro area member states which have entered into programmes with the euro area's stability facilities and meet the programme conditionalities. So far the ECB has not made any purchases under the OMT programme. Like the SMP, the OMT programme is aimed at supporting the monetary-policy transmission mechanism in all euro area member states. Furthermore, the ECB wishes to ensure financial stability and prevent member states from leaving the euro. In other words, the intention is to address imbalances in the government bond market which are attributable to unfounded investor concerns about the collapse of the euro.

CENTRAL-BANK BALANCE SHEETS

Chart 4



Source: ECB, Federal Reserve, Bank of England, Bank of Japan and Reuters EcoWin.

Japan

The Bank of Japan was the first central bank to introduce quantitative easing in recent years, as it began to purchase various securities, primarily long-term government bonds, as far back as in March 2001. Initially, the purpose was not directly to reduce long-term yields, but rather to boost the liquidity of commercial banks, thereby allowing them to increase lending. These purchases ceased in 2006, but were resumed in early 2009 and especially after the announcement of a new purchase programme in October 2010.

Japan's early implementation of quantitative easing is reflected in the Bank of Japan's balance sheet, which already amounted to more than 20 per cent of GDP in 2002. The balance sheets of the three other central banks did not increase significantly until the autumn of 2008. In the 1st half of 2012, the ECB's balance sheet as a percentage of GDP exceeded that of the Bank of Japan, cf. Chart 4.

TRANSMISSION CHANNELS FOR UNCONVENTIONAL MONETARY POLICY

Unconventional monetary policy affects financial markets through various transmission channels, the three most important being the portfolio balance channel, credit easing and the signalling effect, cf. e.g. Joyce et al. (2011b) and Joyce et al. (2012).

The mechanism behind the portfolio balance channel is that the central bank's purchases reduce the remaining supply of long-term gov-

ernment bonds, thereby pushing prices up and yields down. At the same time, the lower yield and smaller supply make private investors turn to other asset classes, which reduces the yields on e.g. mortgage and corporate bonds and increases equity prices. If investors also increasingly opt for foreign assets, the exchange rate weakens. However, the exchange-rate impact may be eliminated if other countries ease their monetary policies correspondingly. The Fed's above-mentioned QE2 and QE3 are examples of measures mainly intended to work through the portfolio balance channel.

Credit easing is aimed at reducing liquidity or risk premia through targeted purchases of assets in specific markets where low liquidity has pushed up risk premia to a level which is out of sync with the central bank's assessment of the economic fundamentals. The Fed's purchases of mortgage-backed assets under QE1 were intended as credit easing.

The third channel is the signalling effect. Besides the direct effect of purchases, the announcement of a purchase programme may send a new signal or increase the credibility of previous announcements that monetary-policy interest rates will be kept at a low level for quite a while. This may dampen expectations of and uncertainty about future monetary-policy interest rates and increase inflation expectations. The signalling may also be more explicit, a case in point being the Fed's recent announcement that the policy rate will be kept low as long as unemployment is above 6.5 per cent and inflation is below 2.5 per cent.

Just as unconventional measures affect the financial markets through various transmission channels, market effects also spill over into the real economy in several ways. For instance, lower interest rates usually have a positive impact on private consumption and investment since households and firms can obtain cheaper financing. Lower interest rates also entail redistribution from lenders to borrowers.

The unconventional measures work through other transmission channels than conventional monetary policy. Consequently, the associated costs and risks are not necessarily the same as those linked to conventional monetary policy, cf. e.g. ECB (2011) and Joyce et al. (2012). The central banks' exposures to losses increase with the size of their purchase programmes, and under the liquidity support programmes the central banks accept securities of lower quality than they would otherwise accept.

The central banks' purchases of government securities have been aimed at reducing the general level of interest rates and ensuring the monetary-policy transmission mechanism – not at funding government budget deficits. It is important that such purchases do not lead to postponement of or failure to implement the necessary fiscal consolidation.

If consolidation does not take place, there is a risk that private investors lose confidence in long-term fiscal sustainability, which will increase government financing costs via higher government yields – thereby aggravating the debt situation further. Ultimately, the result could be that monetary policy is used to finance the government's obligations, i.e. fiscal dominance over monetary policy.

Another aspect of the unconventional measures is that the central banks' purchases in specific markets may affect relative risk premia and distort investor decisions. This may be reflected in inappropriately risky investments, which can create bubbles for certain asset classes.

Monetary policy should generally be tightened as the economy recovers, but due to the above risks associated with unconventional monetary policy it is particularly important to phase out the unconventional measures as the economy normalises.

EVALUATION OF THE PROGRAMMES

Most studies in the literature indicate that the purchase programmes have led to the intended reduction of market yields, although opinions differ as to the size of the impact. At the same time, the programmes seem to have boosted equity prices and other asset prices. The effects on the real economy are more difficult to quantify, e.g. because the programmes work through several transmission channels, cf. above, and there is a certain time lag.

In the literature, various methods are used to analyse the impact of the purchase programmes on financial and macroeconomic variables, cf. Box 1.

One of the few pre-crisis analyses estimates the effect of purchases in the USA and Japan, cf. Bernanke et al. (2004). Empirical evidence for the USA includes the situation in the 1990s when the US Bureau of the Public Debt announced and conducted buy-backs as a result of large budget surpluses. For Japan it is estimated that the central bank's announcements only to a limited extent affected the market expectations embedded in the yield curve. However, the estimation results also indicate that the purchases helped to reduce long-term government yields.

USA

The Fed's liquidity support measures are not discussed as much in the literature as its purchase programmes. In one of the studies analysing the effect of these measures, it is assessed on the basis of model simulations in a DSGE model that they have contributed to preventing an even stronger economic recession than the one seen during the crisis, cf. Del Negro et al. (2011).

METHODS FOR EVALUATING PURCHASE PROGRAMMES

Box 1

The effect of the purchase programmes on yields and other financial variables are most frequently examined by means of event studies. In addition, time series analyses and interest-rate models are used to estimate links between purchases and risk premia in the government and mortgage bond markets.

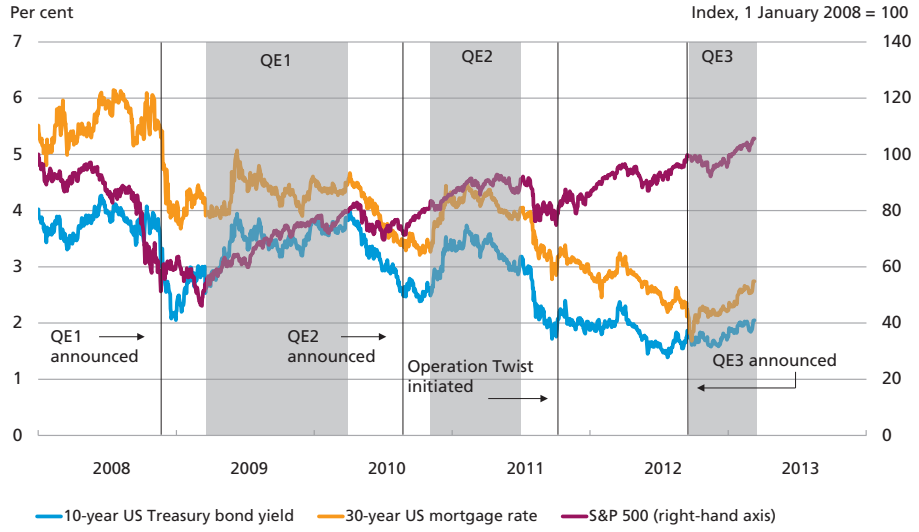
Event studies are detailed studies of specific events in the financial markets. The studies analyse developments in financial variables over selected time intervals of short duration. During the financial crisis, there were many other events than asset purchases. This makes it difficult to identify the isolated effect of purchases. For example, the Fed announced that it would initiate a round of asset purchases and at the same time that it would keep the fed funds rate low for an even longer period. Therefore, the event studies seek to analyse carefully selected and sufficiently narrow time intervals so as to minimise the probability that market events reflect fluctuations driven by other events than the central banks' announcements.

In the event studies it is assumed that the effect of the asset purchase programme is embedded in asset prices over a short period of no more than a couple of days after the announcement. The analysis of particularly the later purchase rounds are complicated by the need to adjust for the information already embedded in the market expectations. If the market already expects an announcement of purchases for a given amount, only the part of the announcement which comes as a surprise to the market will be embedded in the asset prices at the actual time of announcement.

Some analysts calculate the real economic effects of unconventional monetary policy by assuming relations in an empirical macroeconomic model. Another approach to evaluating the effects is to perform analyses within a dynamic stochastic general equilibrium, DSGE, model. When DSGE models are expanded to include financial imperfections, it is possible to remedy these imperfections via special monetary-policy measures. When the effect of unconventional monetary policy is to be assessed in a DSGE model, this is done by considering several scenarios. The first one is a baseline scenario based on the actual monetary policy implemented and with falls in output and inflation that match the data observations. The next scenario considered is a simulated one in which the unconventional monetary-policy measures are assumed to be absent (a "counterfactual" scenario). The partial real economic effects of the purchases are calculated as the difference between the development in GDP and inflation in the baseline and counterfactual scenarios.

Following the announcement of QE1, the 10-year Treasury bond yield and 30-year mortgage yield dropped sharply, cf. Chart 5. In line with this, most studies find that the Fed's purchases helped to eliminate a considerable part of the extraordinarily high risk premium on mortgage-backed securities and reduce the yield on long-term Treasury bonds, cf. Table 1. In the studies, the purchases under QE1 are estimated to have reduced the 10-year Treasury bond yield by around 50 basis points, cf. Chung et al. (2012). Furthermore, there was a spillover effect on related markets, cf. e.g. Gagnon (2011). The Fed's purchases contributed to re-

FINANCIAL VARIABLES AND THE FED'S ASSET PURCHASE PROGRAMMES Chart 5



Source: Bloomberg.

storing a well-functioning secondary market for mortgage-backed securities, cf. e.g. Hancock and Passmore (2011). If this market had not been well-functioning, mortgage rates would have been some 30 basis points higher.

EMPIRICAL ESTIMATES FOR THE USA OF THE EFFECT OF PURCHASES ON LONG-TERM BONDS Table 1

Authors	Empirical evidence	Method	Estimated effect of purchases for 600 billion dollars (± 2 standard deviations) ¹
Bernanke et al. (2004)	Pre-financial crisis	Event study	40 bp (± 60 bp)
Hancock and Passmore (2011)	QE1, mortgage credit only	Time series analysis	30 bp
Gagnon et al. (2011)	QE1	Event study Time series analysis	30 bp (± 15 bp) 18 bp (± 7 bp)
Hamilton and Wu (2011)	QE2	Interest-rate model	17 bp
Swanson (2011)	Pre-financial crisis QE2	Event study	15 bp (± 10 bp)

Note: In the Table, the estimates in the literature have been scaled so as to indicate the effect of purchases for 600 billion dollars (corresponding to QE2). The statistical uncertainty has been stated in brackets after the estimate for the studies for which the standard deviation is reported.

Source: Williams (2011).

Chung et al. (2012) also calculate how much the Fed would have had to reduce the fed funds rate to achieve the same effect on long-term Treasury bond yields as it achieved with QE1. The conclusion is that the effect of QE1 on long-term Treasury bond yields corresponded to reducing the fed funds rate by 2 percentage points. However, this calculation is simplified and based purely on the historical correlation between the long-term Treasury bond yield and the fed funds rate.

The literature generally agrees that QE1 had notable real economic effects, cf. e.g. Gertler and Karadi (2013), who use simulations to demonstrate that QE1 lifted GDP by more than 2 percentage points. One of the reasons for the relatively strong impact on the real economy is that in the model the falling value of the banks' portfolios of e.g. mortgage-backed securities undermines their capitalisation, which in turn restricts their lending. The central bank's purchases push up the prices of these securities, thereby improving the banks' capitalisation and lending opportunities. So in the model, purchases have a large positive impact on the real economy. The analysis comprises the Fed's purchases only, not the other crisis management initiatives such as the Troubled Asset Relief Program, TARP, whereby the US Department of the Treasury made direct capital injections into banks.

As regards QE2, most event studies find that the purchases helped to reduce the yields on long-term Treasury bonds by 15-20 basis points, cf. e.g. Swanson (2011) and Hamilton and Wu (2011). Swanson (2011) also finds that the yield on government-guaranteed securities (e.g. mortgage-backed securities issued by Fannie Mae and Freddie Mac) declined by 13 basis points, i.e. almost as much as the yield on Treasury bonds. There was also a small spillover effect of 2-4 basis points on corporate bond yields. The effect of the QE2 purchases was less pronounced than the QE1 effect; according to Swanson (2011) this is presumably because market functionality was not as severely impeded and liquidity not quite as low as under QE1.

In most studies of QE2 based on macroeconomic relations, the estimated effects on GDP and inflation are considerable. Using the Fed's empirical macroeconomic model for the USA, it has been calculated that QE2 lifted GDP by 0.6 percentage point and inflation by 0.1 percentage point, cf. Chung et al. (2012). But there are also DSGE studies which show considerably smaller estimated real economic effects of QE2, cf. Chen et al. (2012), in which the effect is 0.13 percentage point on GDP and 0.03 percentage point on inflation. One of the characteristics of the DSGE model is that risk premia in the financial markets decline only little when the supply of long-term Treasury bonds is reduced. This influences the results.

UK

It has been estimated that the first round of the BoE's purchase programme reduced the yields on medium- and long-term UK government bonds by approximately 1 percentage point, cf. Joyce et al. (2011a). The effects on other market yields are more uncertain.

The same analysis compares the expected and actual size of the announced purchases. The conclusion is that government yields fall by 0.62 basis point for each extra billion pounds' worth of expected purchases. So the unexpected purchases for 200 billion pounds caused long-term government yields to decline by 125 basis points, broken down by 45 basis points from the signalling effect and 80 basis points via the portfolio balance channel.

Applying various methods, it has been estimated that the first round of the UK purchase programme lifted GDP by 1.5-2 percentage points and inflation by 0.75-1.5 percentage points, cf. Joyce et al. (2011b).

Euro area

In the euro area, the expansion of the lending facilities has helped to ensure that the monetary-policy transmission mechanism has functioned during the crisis. This has been achieved by stabilising the money market, cf. ECB (2011). Similarly, SMP purchases have, according to the ECB, contributed to the efficiency of the monetary-policy transmission mechanism, e.g. by reducing the negative contagion effects from the crisis-ridden euro area member states during the sovereign debt crisis.

Even though the ECB's non-standard measures have not directly been aimed at strengthening demand in the economy, they have had considerable real economic effects, cf. e.g. Lenza et al. (2010) and Peersman (2011). Lenza et al. (2010) conclude that the non-standard measures supported credit extension to the private sector and that without them the unemployment rate would have been 0.5 percentage point higher.

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