

# The Expanded Asset Purchase Programme – What, Why and How of Euro Area QE

By Peter Dunne, Mary Everett and Rebecca Stuart<sup>1</sup>

## Abstract

This article explains the what, why and how of the ECB's expanded asset purchase programme, commonly referred to as 'Quantitative Easing'. The scope and scale of this purchase programme is unparalleled in the euro area and it is expected to have a large effect on the euro area economy. This article discusses the details of the programme, the reasons it was introduced, and the various channels through which it is expected to affect the real economy.

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## 1. Introduction

On 22 January 2015, the Governing Council of the ECB announced that it would purchase government bonds on a large scale<sup>2</sup>, a practice commonly referred to as ‘Quantitative Easing’. With this announcement, the Eurosystem committed to purchasing more than €1 trillion of securities by September 2016. When the programme was announced, headline inflation had been below 1 per cent for over a year, and had turned negative the previous month. The purpose of the programme is to return inflation to a path consistent with the ECB’s stated objective of below, but close to, 2 per cent, over the medium term.

Purchasing public sector bonds is not a new concept. Indeed, the ECB has done so previously, although to a much smaller extent, in the Securities Markets Programme which was initiated in 2010. Furthermore, a number of other central banks, notably the Bank of England and the Federal Reserve have initiated similar programmes since the financial crisis. However, the scale and scope of the current programme is unparalleled in the euro area. The programme is likely to have wide reaching effects on the euro area economy. This article discusses the programme, why it was implemented, its aims, and the channels through which it is expected to affect the real economy.

The article is structured as follows. The next section discusses the context and details of the expanded asset purchase programme. Section 3 discusses the channels through which the programme is expected to affect the real economy. Section 4 concludes.

## 2. What and why: reasons for and details of the programme

Traditionally, central banks ease monetary policy by reducing interest rates. However,

sometimes central banks cut interest rates so low that they cannot reduce them any further; this is referred to as the zero lower bound (ZLB).<sup>3</sup> When this happens, central banks must find other ways to ease monetary policy to increase inflation. In July 2013, with the euro area having reached what was considered to be very close to the zero lower bound<sup>4</sup>, the Governing Council of the ECB attempted to do this by introducing ‘forward guidance’ on the future path of the ECB’s policy rate conditional on the economic outlook – essentially indicating that interest rates would remain at present or lower levels for an extended period of time.<sup>5</sup>

However, having fallen to less than 1 per cent in October 2013, the inflation rate continued to decline through much of the first half of 2014, with little expectation of a near-term pick-up. As a result, on 5 June 2014, the Governing Council announced a package of measures to further ease monetary policy. That package included intensifying preparatory work related to the outright purchases in the asset-backed securities (ABS) market. On 4 September 2014, the Governing Council lowered the main refinancing rate to 0.05 percent and announced that the Eurosystem would purchase simple and transparent ABSs and covered bonds issued by euro area financial institutions, referred to as the asset-backed securities purchase programme (ABSPP) and the third covered bond purchase programme (CBPP3).

These announcements were made in the context of falling inflation and downward revisions to ECB staff projections of inflation and growth. Through the end of 2014 and into early 2015, many indicators of actual and expected inflation in the euro area continued to drift downwards. The Governing Council noted that since *‘potential second-round effects on wage and price-setting threatened to adversely affect medium-term price developments, this situation required a forceful monetary policy*

2 It was also announced that the bonds of agencies and European institutions would be purchased.

3 Although it is referred to as the ‘zero lower bound’, in practice the zero lower bound is not so clearly defined and is considered to be marginally above zero.

4 At that time, the interest rate was 0.5 per cent. Since then three further cuts to the rate have been made, most recently to 0.05 per cent in September 2014.

5 The Governing Council had used several other non-standard measures prior to forward guidance, including the expansion of the collateral framework, the extension of fixed rate full allotment and the provision of very long term liquidity (in the form of VLTROs implemented in December 2011 and February 2012).

*response*'.<sup>6</sup> Furthermore, the sharp decline in crude oil prices had reinforced market expectations of lower inflation, economic slack remained sizeable and credit growth was subdued. As a result, on 22 January 2015 the Governing Council announced that it was adding a public sector purchase programme (PSPP) to the existing ABSPP and CBPP3 programmes. Collectively, they are referred to as the expanded asset purchase programme (expanded APP).

The Governing Council has stated that under the expanded APP it will purchase €60 billion of securities monthly at least until September 2016. These purchases began in March 2015. The PSPP will make up the majority of these purchases. Since it is so much larger in size and scope than the other components of the expanded APP, commentators only began using the term 'Quantitative Easing' after the PSPP was announced (similarly, large asset purchase programmes in other countries also attracted the same name, see Box 1). However, the expanded APP includes all three of these programmes; for instance, the

monthly €60 billion purchase target relates to purchases under the CBPP3, the ABSPP and the PSPP.

The aim of the expanded programme announced in January 2015 was to fulfil the ECB's price stability mandate, and to mitigate the risk of a too prolonged period of low inflation by firmly anchoring medium to long-term inflation expectations. With interest rates at their lower bound, the Governing Council intends that the purchase of securities, and the easing in the monetary stance that this entails, will improve financing conditions for firms and households in the euro area. Furthermore, it is intended that the programme will reinforce the Governing Council's forward guidance and highlight the differences in the monetary policy cycle between major advanced economies, since it has been stated that the monthly purchases will continue until the Governing Council believes that the inflation path is consistent with rates in line with the ECB's medium term target, but at least until September 2016.

### **Box 1: Quantitative Easing programmes in the US and the UK**

*By Danielle Kedan*

Many central banks have conducted quantitative easing programmes in response to the financial crisis. This Box discusses those initiated by the Federal Reserve and the Bank of England, and outlines some evidence of the impact of these programmes.

#### *Federal Reserve*

The Federal Reserve has conducted three QE programmes since late 2008, in the wake of the collapse of Lehman Brothers. These are popularly referred to as QE1, QE2 and QE3. In November 2008, the Federal Open Market Committee (FOMC) of the Federal Reserve announced a programme (QE1) to purchase up to \$600bn in agency mortgage-backed securities (MBSs) and agency debt<sup>7</sup> with the stated aim of reducing the costs of borrowing and increasing the availability of credit for house purchases. With the continued economic contraction, however, the FOMC decided in March 2009 to substantially expand the programme in order to support economic recovery and preserve price stability. It was announced that up to \$1.25 trillion of agency MBS would be bought, along with up to \$200bn of agency debt and up to \$300bn of longer-term Treasury debt. These purchases were completed in early 2010 and amounted in total to just under 12 per cent of US GDP.<sup>8</sup>

<sup>6</sup> See press statement, 22 January 2015: [http://www.ecb.europa.eu/press/pr/date/2015/html/pr150122\\_1.en.html](http://www.ecb.europa.eu/press/pr/date/2015/html/pr150122_1.en.html)

<sup>7</sup> The agencies associated with this debt were housing-related government-sponsored enterprises. Debt issued by these agencies was viewed by market participants as benefitting from an implicit government guarantee.

**Box 1: Quantitative Easing programmes in the US and the UK***By Danielle Kedan*

In November 2010, it was announced that the Federal Reserve would expand its balance sheet further by purchasing an additional \$600bn in longer-term Treasuries by the end of the second quarter of 2011, at a pace of about \$75bn per month (QE2). With the aim of supporting economic recovery and ensuring that inflation would be at levels consistent with price stability over time, the FOMC decided in September 2011 to extend the maturity of its securities holdings.

The Maturities Extension Program, also known as “Operation Twist”, involved the purchase of \$400bn of Treasury securities with remaining maturities of 6 to 30 years, funded by the sale of an equal amount of Treasury securities with remaining maturities of 3 years or less. The last expansion of the Federal Reserve’s asset purchases (QE3) was announced in late 2012, when the FOMC decided to purchase additional agency MBS at a pace of \$40bn per month and to continue reinvesting principal payments from agency debt and agency MBS in agency MBS. In addition, the Committee decided to further expand its holdings of Treasury securities at a pace of \$45bn per month. Purchases were reduced gradually throughout 2014 and were concluded in October of that year. In total, the Federal Reserve’s asset purchases amounted to over 20 per cent of US GDP.

*Bank of England*

In early 2009, the Bank of England’s Asset Purchase Facility (APF) was established. The objectives of the APF were twofold. First, high-quality private sector securities (commercial paper and corporate bonds) could be purchased with the aim of improving market liquidity and increasing the flow of corporate credit. Second, the APF could be used for monetary policy purposes to ease the stance of policy through the purchase of medium- to long-maturity UK government bonds via the creation of central bank reserves. Although some private sector securities were purchased as part of the Bank of England’s asset purchase programme, purchases of UK government bonds dominated the APF.

Purchases under the APF began in March 2009, when the Monetary Policy Committee (MPC) stated that it would buy £75bn of assets over three months. In May of that year, the MPC announced an extension of asset purchases by an additional £50bn. The APF was extended again later in 2009, bringing purchases to £200bn by the end of the year.<sup>9</sup> Amid deterioration in the medium-term inflation outlook, the Bank of England announced another expansion of asset purchases by £75bn in October 2011. Further expansions were announced in 2012, bringing the total size of the APF to £375bn by end 2012, which amounted to over 20 per cent of GDP.

The table below presents a broad summary of the Federal Reserve and Bank of England QE programmes.

	Assets included	Maturities of sovereign bonds purchased	Total amount purchased (sovereign +other)
<b>Federal Reserve</b>			
QE1 12/08-03/10	US Treasuries, agency debt and agency MBS	Focus on 2-10 years	\$1,750bn
QE2 11/10-06/11		Focus on 2-10 years	\$600bn
QE3 09/12-10/14		Focus on 7-10 and 20-30 years	\$1,630bn
<b>Bank of England</b>			
03/09-11/12	UK gilts, corporate bonds and commercial paper	Focus on 5-25 years	£375bn

**Box 1: Quantitative Easing programmes in the US and the UK**

*By Danielle Kedan*

*Estimated impact of these measures*

Studies find that central bank asset purchase programmes in the US and UK during the financial crisis had a positive effect on both GDP and inflation. Estimates of the magnitude of the effects of QE fall within a wide range, however, as illustrated in a literature review by the IMF (2013). Direct comparison of results across studies is complicated by the fact that sample periods vary between papers and different approaches can be used to assess the macroeconomic impact of QE. Focusing on a recent paper, Weale and Wieladek (2014) find that asset purchases worth 1 per cent of nominal GDP have positive effects on real GDP and inflation of 0.36 per cent and 0.38 per cent in the US, and of 0.18 per cent and 0.3 per cent in the UK, respectively.

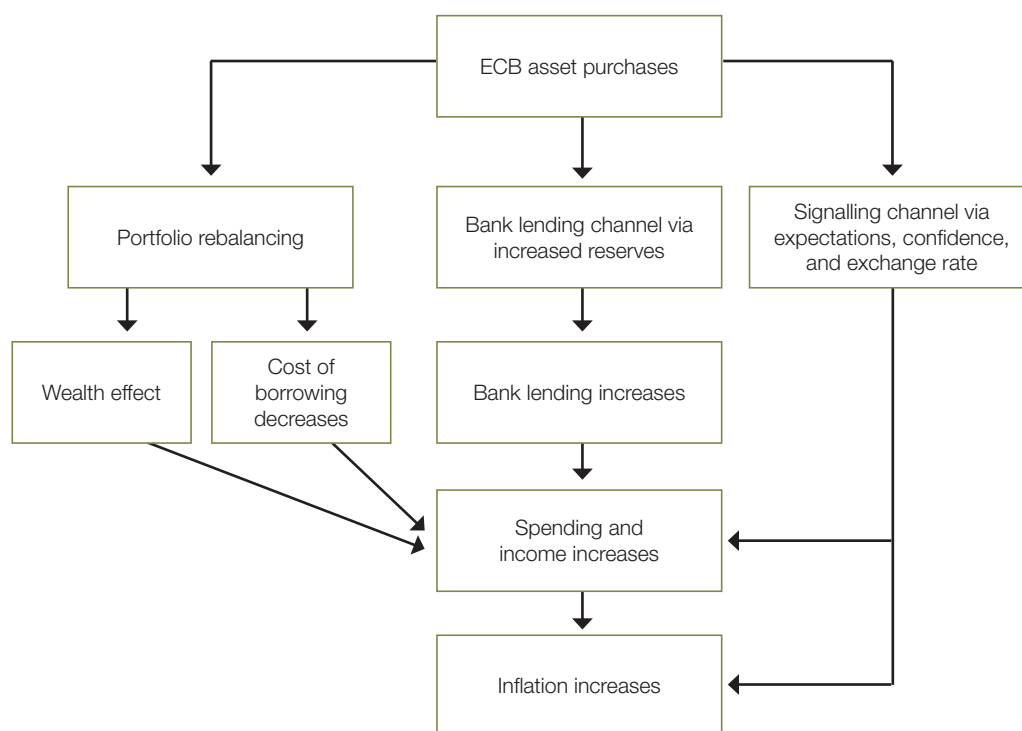
<sup>8</sup> Nominal GDP in 2010.

<sup>9</sup> For further discussion of the Bank of England's quantitative easing policy, see Joyce et al. (2011).

### 3. How will the expanded APP work?

This section describes the main channels through which the expanded APP can be expected to affect the real economy. Care must be taken in interpreting indicators at this stage. Firstly, changes in economic data can occur for a number of reasons, including a general economic upturn, and we do not attempt to disentangle these effects. Secondly, monetary policy tends to affect the economy with long and variable lags. It is thought that when central banks change interest rates the economic effect is only felt 1-2 years later, while purchases under the expanded APP have only been taking place since March 2015. As such what is presented in this Section describes the likely ways in which the programme will impact the economy, rather than attempting to quantify the actual impact at this early stage. Nonetheless, a more in-depth analysis will allow firmer conclusions to be drawn. Ample international literature points to effects of quantitative easing programmes in other countries across a range of variables. Drawing on this, the Central Bank will estimate the impact of the expanded APP on the euro area economy as more data become available. Box 2 gives an overview of some of the methods that could be employed.

The mechanism through which central bank asset purchases is expected to work is to expand broad money supply, thereby raising asset prices, lowering bond yields and reducing long-term interest rates. As a result, there should be a greater incentive to spend money today rather than save, and thus the economy can be stimulated, and inflation increased. In this context, three primary channels through which a central bank's purchases of government securities can affect the real economy have been identified in the economic literature: the portfolio rebalancing channel, the bank lending channel and the signalling channel. Figure 1 presents a stylised framework that highlights these three transmission channels and their macroeconomic outcomes. In the following sections, these three channels are discussed in more detail.

**Figure 1:** Transmission channels of asset purchases to the macro economy**Box 2:** Conducting in-depth analysis of the effect of the expanded APP on the euro area*By Peter Dunne and Mary Everett*

As of yet there are too few data observations to conduct an in-depth analysis of the macroeconomic effect of the expanded APP. Furthermore, it cannot be inferred that changes observed so far in macroeconomic and financial data are caused by the programme itself or by other factors, such as the general economic upturn. However, once more data are available a number of techniques can be used. This Box describes some of these methods.

The direct and indirect price-effects of the expanded APP can be assessed by using an ‘event-study’ methodology.<sup>10</sup> This method seeks to isolate the effect of programme purchases, or ‘events’, by using high frequency event data. The relationship between bond price movements and purchase amounts (in a variety of pre- and post-‘event’ windows) is estimated and tested for statistical significance. Other variables that normally explain variation in bond price movements are included to control for their effects. The effect of the announcement of the expanded APP, and the anticipation of the announcement, can be assessed in a similar way, with the price effects averaged across a number of individual bonds and across different bond markets.

Event study methods can also be used to isolate the impact of the expanded APP on corporate bond prices and other close substitutes for sovereign bonds. These wider effects of the expanded APP can be expected as a result of the portfolio rebalancing behaviour of investors (discussed in Section 3.1). Examination of changes in investors’ portfolios compared to their historical behaviour (using the methods of Butt et al., 2012) can help determine whether the expanded APP is the main cause of recent developments. In addition, the positive effects of asset purchases on new bond issuance activity can be assessed using regression techniques that control for other potential explanations of such activity.<sup>11</sup>

**Box 2: Conducting in-depth analysis of the effect of the expanded APP on the euro area**  
By Peter Dunne and Mary Everett

The signalling effects of intervention programmes can be measured by analysis of adjustments in inflation and interest rate expectations. This can be assessed by examining whether revisions in these expectations around the time of the expanded APP are statistically significant, and whether they indicate a change in perceptions about how effective the Eurosystem will be in achieving its inflation objectives. Two broad approaches have been taken in the literature. The first assesses whether the term structure of interest rates has changed due to the pass-through to longer term yields of the expectations that short term rates will stay lower for longer than usual (e.g., Bauer and Rudebusch, 2013). A second assesses whether there has been any change in the anchoring of long term inflation expectations by modelling the Phillips curve which controls for the effects of a narrowing of the output gap (e.g., Kaihatsu and Nakajima, 2015). Whether changes in inflation expectations matter for actual inflation through their influence on wage bargaining and price setting, as described by Krugman (1998), Svensson (2003) and Woodford (2012), may be considered as part of post-expanded APP research plans using an approach similar to Gilchrist et al., 2015.

<sup>10</sup> For example, an event study can be used to identify the response of a price variable to an unanticipated event, such as the ECB's announcement on January 22nd on euro area government bonds.

<sup>11</sup> See Marco Lo Duca, Giulio Nicoletti and Ariadna Vidal Martinez (2014).

### 3.1. Portfolio rebalancing channel

The portfolio rebalancing channel is frequently considered to be the most effective channel through which central bank asset purchases impact the real economy. Since the central bank purchases government securities with cash<sup>12</sup>, institutions that sell securities have two choices in terms of what to do with the cash: firstly, they may retain the proceeds of their sales on deposit (the consequences of this for bank lending are discussed below), or, secondly, they may use the cash to purchase other assets (reallocate their portfolios towards other assets), for example corporate bonds and/or equity securities. Greater demand for these assets increases their prices and lowers their yields. Higher asset prices increase the wealth of holders, which should result in a boost to their spending. Falling bond yields reduce the borrowing costs for corporates (and other issuers of bonds) resulting in investment, thereby improving the prospects for the real economy.

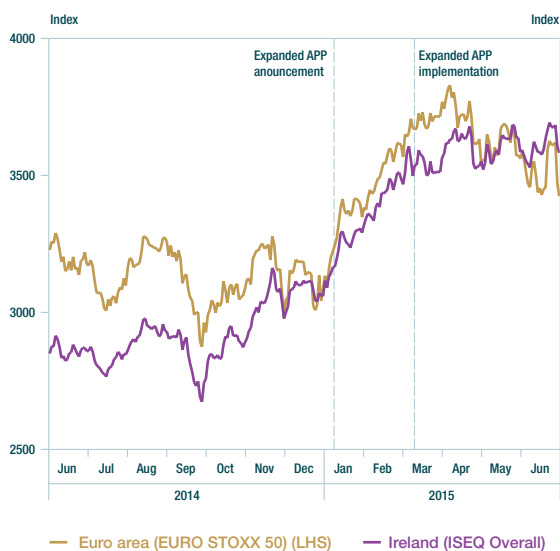
Empirical evidence in support of this transmission mechanism has been found in studies for the US, UK and Japan. In their study of the Federal Reserve's public and private asset

purchase programmes, Carpenter et al. (2015) found that sellers to the Federal Reserve were mainly households and other non-bank financial institutions, comprising hedge funds, broker dealers and insurance companies. Subsequent portfolio rebalancing by these investors was largely towards corporate bonds. Joyce et al. (2014) examine the effects of the Bank of England's quantitative easing policy on the investment behaviour of institutional investors. Their micro-level analysis of UK insurance companies and pension funds shows that sales of UK Gilts to the Bank of England give rise to reinvestment in riskier assets by these investors in the form of corporate bonds. An examination of portfolio rebalancing in Japan is presented in Hogen and Saito (2014). During the Quantitative and Qualitative Monetary Easing programme introduced in April 2013, Japanese banks and foreign investors were the largest sellers of government bonds to the Bank of Japan. Portfolio rebalancing towards bank loans, equity securities and corporate bonds took place following sales by these investors of their government bonds.

Given the expected transmission mechanism of the portfolio rebalancing channel, the impacts of the expanded APP may be seen in

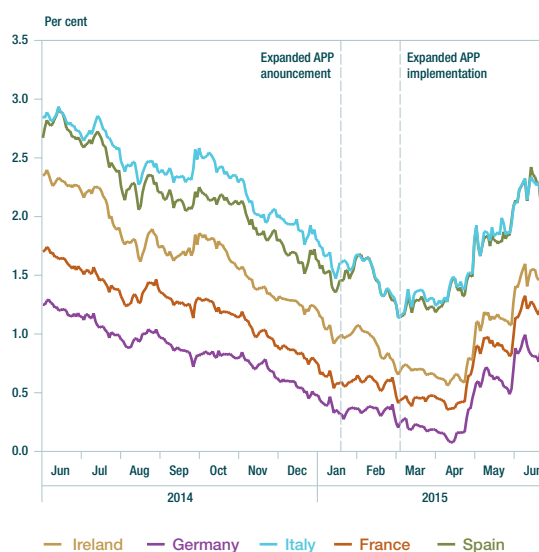
<sup>12</sup> The "cash" received in exchange for government securities by banks is technically termed central bank reserves. The deposit accounts of non-bank investors are credited in exchange for selling government securities to the central bank.

Figure 2: Irish and euro area equity indices



Data source: Thomson Reuters Datastream.

Figure 3: Irish and selected euro area government 10 year bond yields



Data source: Thomson Reuters Datastream.

developments in equity prices and government bond yields. In particular, should it act to raise demand for both of these assets, we would expect the price of both to rise, with the effect that government yields fall.<sup>13</sup> The value of equities in Ireland and elsewhere in the euro area increased following the ECB's announcement of the expanded APP on January 22, and this trend continued following the start of purchases on March 9 (Figure 2). Following the announcement of the programme, yields on Irish government bonds continued their downward trajectory (Figure 3). More recent increases in Irish and euro area government bond yields in May and June may reflect improved macroeconomic fundamentals, increased euro area government bond issuance, developments in the UK and US and the overshooting of yield declines.

### 3.2. Bank lending channel

The central bank 'creates' money when it buys government securities from a bank.<sup>14</sup> Banks

require a certain amount of cash to meet daily requirements<sup>15</sup>, however banks will not usually choose to hold cash in excess of these requirements, and will instead seek to make a return on it. Since cash attracts a low rate of interest (currently a negative rate in the euro area), banks could benefit from an expansion of lending to the real economy, subject to their own capital constraints.<sup>16</sup>

Even if the central bank buys assets from financial institutions that are not banks (for instance, pension funds hold large quantities of government bonds) this can still indirectly affect bank lending. When a non-bank investor sells government bonds to the central bank, the cash it receives becomes a deposit at its commercial bank. If they do not use this cash to invest in an alternative asset, the deposits held by the commercial bank expand. The bank may choose to employ these new deposits by expanding its credit supply to the real economy.

<sup>13</sup> Indeed, the reduction in sovereign borrowing costs across the euro area as well as the repatriation of central bank profits to governments is likely to have an impact on euro area public finances.

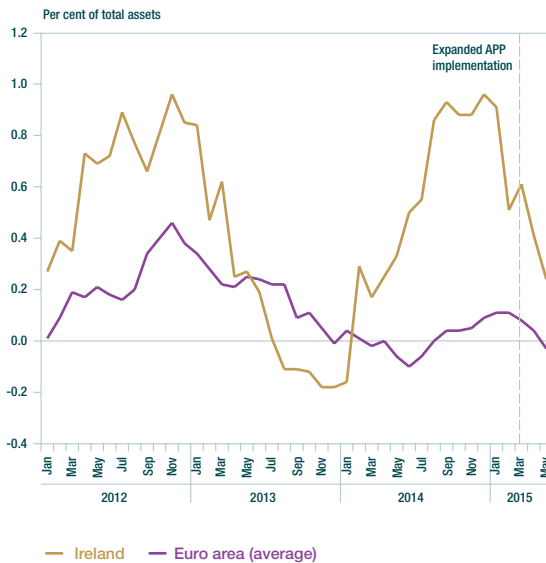
<sup>14</sup> That is, there is an increase in the monetary base, or reserves held by banks at the central bank plus currency in circulation equal to the amount of central bank asset purchases.

<sup>15</sup> Particularly, reserve requirements and liquidity needs.

<sup>16</sup> A detailed discussion of how an asset purchases programme affects money supply can be found in Butt et al. (2012).



**Figure 4:** Change in Irish and euro banks' holdings of euro area government securities as a percentage of total assets



**Data sources:** Central Bank of Ireland Money and Banking Statistics and ECB Statistical Data Warehouse.

Another indirect effect, which acts counter to the above, is the impact on bank lending through a reduction in long-term interest rates. This can lower banks' net interest margins, and, if they are capital constrained, reduce their ability to lend to the real economy.

In terms of the impact of the bank lending channel in Ireland, according to the ECB's April Bank Lending Survey (BLS), Irish banks expect the expanded APP to support their credit supply to households and non-financial corporates due to increased availability of liquidity, as opposed to an easing of credit standards. However, it is not possible at this stage to determine the extent to which this has occurred. The BLS responses also indicated that Irish banks intended to increase asset sales in the second quarter of 2015. Holdings of euro area government securities by Irish and euro area banks have been declining since the beginning of 2015, a trend which has continued since the implementation of the ECB's PSPP in March (Figure 4). If non-bank financial institutions, including insurance companies and pension funds, were selling

government securities to the ESCB their deposits in commercial banks would also rise.

### 3.3. Signalling channel

The announcement and implementation of an asset purchase programme by a central bank demonstrates its intention to meet its inflation objective and signals that it expects to maintain interest rates at a low level for a sustained period.<sup>17</sup> Increased confidence and certainty in the economic outlook, alongside the low level of long-run real interest rates should not only encourage spending but could also increase credit demand. Furthermore, by weakening the euro against other currencies, the programme can raise inflation expectations since demand increases for exports, and imports become more expensive. Finally, higher inflation expectations could cause firms to raise prices in anticipation, leading to a more direct impact on inflation.

## 4. Conclusion

The announcement of the expanded APP by the Governing Council of the ECB in January 2015 marked the beginning of an unprecedented programme of asset purchases in the euro area, the effect of which is likely to be wide ranging. This article has discussed the reasons behind the decision to introduce the programme, the details of how the programme will be carried out, and the channels through which it is expected to affect the real economy. Three channels in particular are highlighted: the portfolio rebalancing channel, the bank lending channel and the signalling channel. Finally, the article outlines some of variables which might reasonably be affected by the programme. However, it is beyond the scope of this article to draw firm conclusions on the effect of the programme. Ample international literature points to effects of quantitative easing programmes in other countries across a range of variables. Drawing on this, the Central Bank will estimate the impact of the expanded APP on the euro area economy as more data become available.

<sup>17</sup> Indeed, this is explicitly part of the intention with the announcement of the PSPP, see Section 2 for discussion.

**Box 3: The role of national central banks in the expanded APP***By William Hynes and Rebecca Stuart*

This Box outlines some of the details of how purchases will be made under the expanded APP and the effect that purchases will have on central banks' balance sheets. The programme will be conducted on a decentralised basis, thereby having a significant impact on the balance sheet of national central banks (NCBs). In conducting these purchases, NCBs are guided by the modalities of the programme as set out by the Governing Council, some of which are also discussed here.

During the programme, €60 billion in securities will be purchased per month. The vast majority of this will be under the PSPP, through which bonds issued by euro area central governments, agencies and European institutions will be purchased in secondary markets. With regard to agencies and institutions who sell assets to the ECB, the intention is that these institutions will buy other assets and extend credit to the real economy. In terms of central government debt, each NCB will focus exclusively on its home market, with purchases determined by the ECB's capital key.

Public sector securities must have a remaining maturity of between 2 and 30 years at the time of purchase. The Eurosystem will be considered on the same level as private investors in terms of creditor treatment. To ensure that the Eurosystem does not obtain a blocking minority in the event of a debt restructuring involving collective action clauses, the securities will also be subject to an issue limit of 25 per cent, and an issuer limit of 33 per cent. The issuer limit is also intended to *'safeguard market functioning and price formation as well as to mitigate the risk of the ECB becoming a dominant creditor of euro area governments'*.<sup>18</sup> Purchases of securities of European institutions (which will be 12 per cent of PSPP purchases) will be subject to loss sharing, but NCBs' purchases of sovereign bonds will not.

The primary impact of asset purchases is to increase the balance sheet size of NCBs as well as the Eurosystem as a whole. In meeting their monthly purchase quota, each NCB is likely to purchase bonds from both domestic and international counterparties. Purchases from domestic counterparties will result in an increase in their current account holdings<sup>19</sup> at the NCB corresponding to the value of the assets purchased. Purchases from international counterparties are slightly more complicated, and may well result in higher Eurosystem liabilities for the purchasing NCB rather than increased current account holdings of domestic institutions. Nonetheless, regardless of the location of the counterparty, the same outcome of asset purchases follows for the Eurosystem; increased central bank asset holdings funded by the provision of additional liquidity to the banking system.

<sup>18</sup> See Q&A on PSPP: <https://www.ecb.europa.eu/mopo/liq/html/pspp-qa.en.html>

<sup>19</sup> This is because, any excess liquidity in the system will, by default, end up on the central bank's balance sheet. An institution's current account with the central bank is made up of its minimum reserve requirement plus any excess to this amount. Minimum reserve requirements are remunerated at the MRO rate (0.05%), while any excess above this amount as well as holdings in the deposit facility are remunerated at the deposit facility rate (-0.2%).

## References

- Bauer, M. D. and Rudebusch, G. D. (2013). "Monetary policy expectations at the zero lower bound," Federal Reserve Bank of San Francisco Working Paper Series, 18.
- Butt, N., Domit, S., McLeay, M., Thomas, R. and Kirkham, L. (2012). "What can the money data tell us about the impact of QE?" Bank of England Quarterly Bulletin, Bank of England, Vol. 52, No.4, pp. 321-331.
- Carpenter, S., Demiralp S., Ihrig, J. and Klee, E. (2015), "Analyzing Federal Reserve asset purchases: From whom does the Fed buy?" *Journal of Banking & Finance*, Vol. 52, pp. 230–244.
- Gilchrist, S., Schoenle, R., Sim, J. W., and Zakrajsek, E. (2015). "Inflation Dynamics During the Financial Crisis," Washington Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series, 2015-012.
- Hogen, Y. and Saito, M. (2014). "Portfolio Rebalancing Following the Bank of Japan's Government Bond Purchases: Empirical Analysis Using Data on Bank Loans and Investment Flows," Bank of Japan Research Papers 14-06-19, Bank of Japan.
- IMF (2013). "Unconventional monetary policies – recent experience and prospects," Staff note, 18 April.
- Joyce, M., Tong, M. and Woods, R. (2011). "The United Kingdom's quantitative easing policy: design, operation and impact," Bank of England Quarterly Bulletin, Bank of England, Vol. 51, No. 3, pp. 200-212.
- Joyce, M., Liu, Z. and Tonks, I. (2014). "Institutional investor portfolio allocation, quantitative easing and the global financial crisis," Bank of England working papers 510, Bank of England.
- Kaihatsu, S. and Nakajima J. (2015). "Has Trend Inflation Shifted?: An Empirical Analysis With a Regime-Switching Model," Bank of Japan Working Paper Series, No. 15-E-3.
- Krishnamurthy, A. and Vissing-Jorgensen, A. (2011). "The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy," NBER Working Papers 17555, National Bureau of Economic Research.
- Krugman, P. R. (1998). "It's Baaack: Japan's Slump and the Return of the Liquidity Trap," Brookings Papers on Economic Activity No. 2, pp.137-206.
- Lo Duca, M., Nicoletti, G. and Vidal Martinez, A. (2014). "Global Corporate Bond Issuance: What Role for US Quantitative Easing?" ECB Working Paper Series No. 1649.
- Svensson, L. E. O. (2003). "Escaping from a Liquidity Trap: The Foolproof Way and Others," *Journal of Economic Perspectives*, 17(4), pp.145-166.
- Weale, M. and Wieladek, T. (2014). "What are the macroeconomic effects of asset purchases?" External MPC Unit Discussion Paper No. 42, Bank of England.
- Woodford, M. (2012). "Methods of Policy Accommodation at the Interest-Rate Lower Bound," Working Paper for Jackson Hole Symposium.