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EUROSISTEMA

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THE EUROSISTEM'S ASSET PURCHASE PROGRAMMES FOR MONETARY POLICY PURPOSES

by Pietro Cova* and Giuseppe Ferrero*

Abstract

This paper analyzes the operation of the Eurosystem's public and private assets purchases programmes for monetary policy purposes, quantifying the potential effect on the Italian economy. First we give an exhaustive account of the main transmission channels by which the purchases can be expected to affect economic activity and inflation. Then we assess the effects on the main channels of transmission to the economy and measure the impact on the main macroeconomic variables, applying the Bank of Italy's quarterly model. For 2015-16 the purchase programme can be expected to make a significant contribution to the growth of output and of prices, of more than 1 percentage point in both cases. Among the channels examined, the largest contribution is judged to come through the depreciation of the euro and the reduction in the interest rates on government securities and bank loans. These effects are comparable in magnitude to those found by studies on the securities purchase programmes conducted in the United States and the United Kingdom.

JEL Classification: E51, E52, E58.

Keywords: Unconventional monetary policy, inflation, monetary policy transmission mechanism, asset purchase programme.

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1. Introduction

The primary objective of the Eurosystem's monetary policy is to maintain price stability, defined as an inflation rate below but close to 2 per cent over the medium term. In normal times monetary policy operates by steering short-term interest rates: the central bank provides reserves to the banking system and sets the official interest rates; given its monopoly power over the issuing of reserves, the central bank can fully determine the cost that banks pay to obtain them. In particular, when inflation falls below the level consistent with the definition of price stability, the official interest rates are lowered. This directly affects money-market interest rates and, through the transmission mechanism, the other nominal interest rates in the economy. In the presence of price rigidities, the reduction in nominal interest rates implies a decline in real interest rates, on which households and firms base their saving and investment decisions. Everything else being equal, lower real interest rates make it more attractive for households and firms to take out loans for financing consumption and investment. The expansion of aggregate demand puts upward pressure on prices and pushes inflation back to a level consistent with the definition of price stability.

However, there is a limit to the central bank's ability to lower interest rates. The possibility of holding cash, whose nominal yield is zero, prevents the nominal yield on any financial asset from going significantly negative. When this constraint – the zero lower bound (ZLB) – binds, real interest rates are determined solely by inflation expectations. Once the ZLB is reached, the central bank is no longer in a position to counter the decline of inflation below the objective by lowering official interest rates. In these circumstances there may be a heightened risk of a de-anchoring of inflation expectations from the central bank's objective and of a further increase of real interest rates. The probability of a deflationary spiral or at least of a prolonged period of low growth both in economic activity and in prices increases.

To stimulate aggregate demand and bring inflation back on a path consistent with its definition of price stability, the central bank has to resort to other monetary policy measures, including the purchase of public and private securities. Such measures were taken, for example, by the Bank of Japan, the first time in 2001, and by the Federal Reserve and the Bank of England, following the global financial crisis in 2008.¹ In January 2015 the Governing Council of the ECB decided to extend to public sector securities the programme of private sector euro-area financial asset purchases begun in September 2014.²

This paper studies the functioning of the Eurosystem's asset purchase programmes and quantifies their potential impact on the Italian economy. Section 2 describes the main channels through which the central bank's asset purchases ease financing conditions in the economy, influence the decisions of households and firms and help to sustain the expansion of economic activity. This expansion is a fundamental prerequisite for a persistent adjustment in the path of inflation towards a level that is consistent with the definition of price stability. Section 3 focuses on the Expanded Asset Purchase Programme (APP) announced by the Governing Council of the ECB in January 2015 and evaluates its potential effects on the Italian economy.

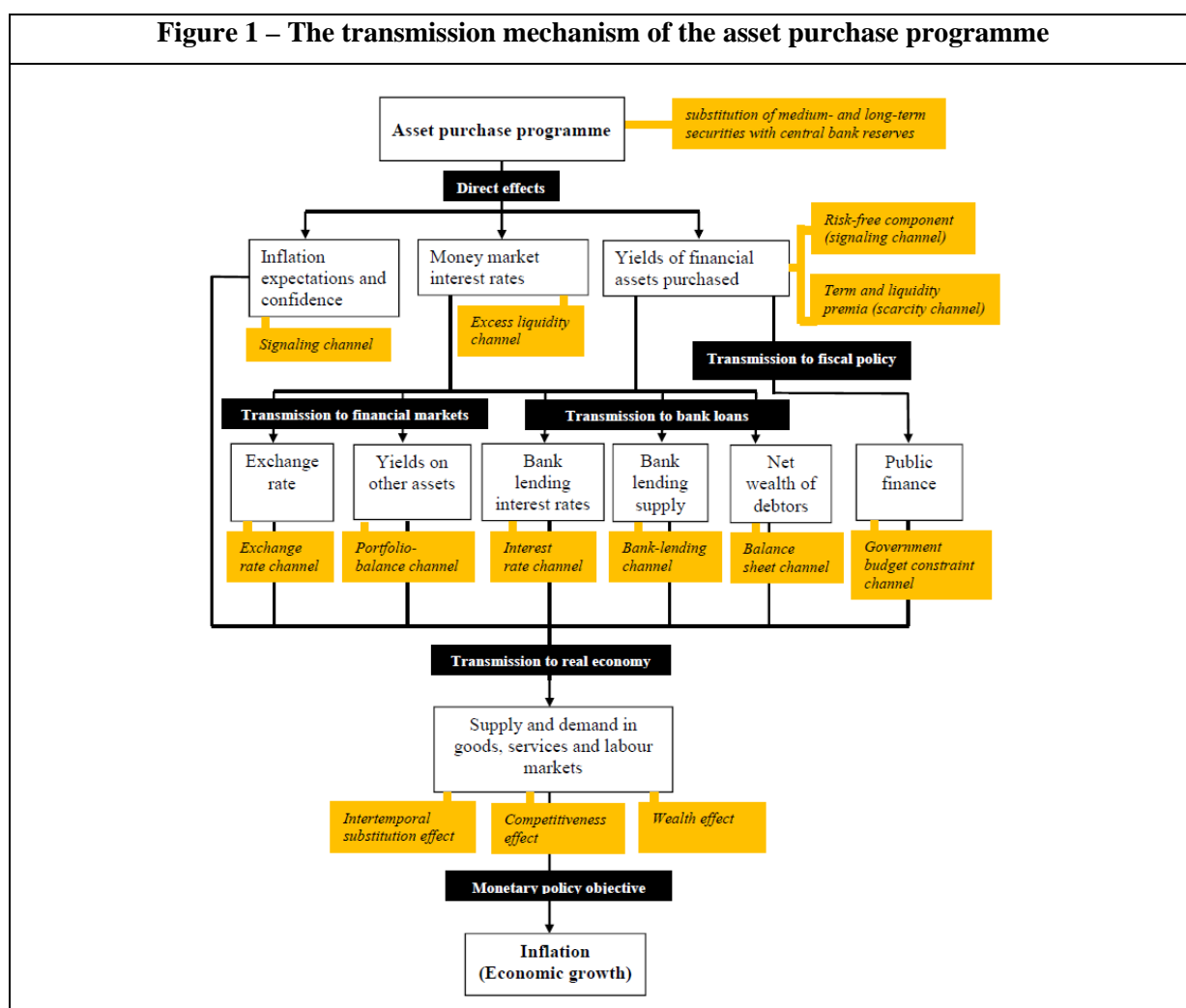
¹ For a review of the measures taken by the leading central banks during that crisis, see Cecioni, Ferrero and Secchi (2011).

² Previously, the Council had taken other exceptional measures, aimed at supporting credit to the economy and addressing impairments in the monetary policy transmission mechanism. For an analysis of the effects of the measures taken during the global financial crisis and the subsequent sovereign debt crisis, see Casiraghi, Gaiotti, Rodano and Secchi (2013).

2. The mechanism through which the asset purchase programme works

By purchasing financial assets, the central bank expands its balance sheet and it alters the composition of economic agents' portfolios. The expansion of the central bank's balance sheet involves, on the asset side, the increase of securities purchased and, on the liability side, the increase of reserve balances held by financial institutions at the central bank (current accounts covering the minimum reserves and the deposit facility). The change in portfolio's composition is a mechanic consequence of the reduced availability of those assets that have been purchased – which generally feature low credit risk and relatively long maturity – and the increased volume of other highly liquid assets, i.e. central bank reserves. The macroeconomic effects of these policy measures derive not only from the injection of reserves, which are often seen as the principal channel,³ and from the change in the composition of private sector balance sheets, but also from the effect on expectations and confidence of economic agents.

The channels through which the programme of public and private sector securities purchases affects economic activity and inflation are shown in Figure 1.



³ According to the quantity theory of money, in the long run, a change in the growth rate of the monetary base (central bank reserves + currency) corresponds to an equal change in inflation. Nevertheless, the impact of large-scale asset purchase programme is not necessarily tied to an automatic increase in central bank reserves. On this point see, for instance, Borio and Disyatat (2010)

2.1 The direct effects

The replacement of longer-term securities with central bank reserves has three direct effects: (i) on the prices and yields of the assets included in the purchase programme; (ii) on money market interest rates; and (iii) on the inflation expectations and confidence of households and firms.

2.1.1 Yields of the assets purchased

First of all the programme directly affects the yields on the financial assets included in the purchase programme.

At time t the yield on a security maturing at time $t+n$, $i_{t,t+n}$, can be decomposed into a risk-free component, $i_{t,t+n}^{RF}$, and a risk premium component consisting of the term premium, tp_t , the liquidity premium, lp_t and the credit risk premium, cp_t ; the risk-free component of a security maturing at time $t+n$ can in turn be expressed as the average of current and expected short-term risk-free interest rates, determined by monetary policy decisions and by the presence or absence of excess reserves in the banking system.

$$i_{t,t+n} = \left[1/n \sum_{j=0}^{n-1} E_t(i_{t+j,t+j+1}^{RF}) \right] + tp_t + lp_t + cp_t,$$

The risk-free component. By signaling the central bank's intention to keep monetary conditions accommodative for an extended period, the purchase programme lowers expectations about future money market interest rates and thus reduces the risk-free component of the yield on the financial assets purchased (*the signaling channel*). The strength of the signal is reinforced by the fact that the central bank would be exposed to possible balance-sheet losses should it elect to raise the official interest rates in the short run.⁴

Risk premiums. A programme for the purchase of long-term securities may lower the liquidity premium (because it increases the demand for the financial assets covered) and the term premium. The theoretical and empirical literature suggests that the effect on this yield component depends on certain characteristics of the assets, including the maturity and the issuer.⁵ Since some investors have a preference for longer-term low-risk assets issued in their home country, a reduction in the volume of such assets available on the market will lower the yield that investors demand for holding them. For instance, institutional investors such as pension funds might want to hold a fixed amount of ten-year government bonds in their portfolios. In this case, government securities of different residual maturity would not be a perfect substitute; that is, a reduction in the volume of securities of a particular maturity will generate what can be dubbed a 'local scarcity' (*the scarcity channel*). Imperfect substitutability implies that the elasticity of price to supply is very high. In other words, the greater the price inelasticity of the demand for securities in the maturity segment in which it intervenes, the more effective the central bank's purchases will be in lowering yields.

⁴ The central bank can pursue two strategies for making monetary policy less accommodative and raising short-term interest rates. One is to raise the official interest rates while leaving excess liquidity in the economy. In this case it might have to pay an overnight deposit rate higher than the yield on the securities it has bought. Alternatively it could raise the rates and mop up the excess liquidity by selling securities or issuing term deposits. Here too the central bank could be exposed to losses.

⁵ See, for example, Vayanos and Vila (2009) for a theoretical model and D'Amico and King (2012) for empirical evidence.

2.1.2 Money market interest rates

The replacement of financial assets with central bank reserves leads to an increase in excess reserves over and above the banking system's liquidity requirement. When monetary policy operations are characterized by a 'corridor' of official interest rates⁶ and excess liquidity is abundant money market interest rates tend to converge on the lower limit of the corridor, namely the deposit facility rate.⁷ Accordingly, one of the effects of asset purchases is to lower money market rates towards the interest rate on the deposit facility (*the excess liquidity channel*). Where there is already excess liquidity and short-term rates are near the ZLB, however, this effect may be very modest indeed.

2.1.3 Inflation expectations and confidence

Given that the central bank's objective is price stability, when it announces that it will employ a monetary policy measure consistently and over a prolonged period in order to set inflation on a path consistent with the definition of price stability, economic agents' expectations will move in the direction of the target. The more credible the announcement and the more resolute and effective the measures, the greater the public's confidence in the central bank's ability to attain the objective and the larger the impact on inflation expectations and the confidence of firms and households (*the confidence channel*).

2.2 The transmission to the financial system

The decline in money market interest rates and in the yields of the financial assets included in the purchase programme affects aggregate demand and price dynamics through a series of indirect channels: by altering the yields on other financial assets (*the portfolio balance channel*); by lowering the cost and increasing the availability of bank loans (*the bank lending, interest rate and balance sheet channels*); by causing a depreciation of the domestic currency (*the exchange rate channel*); and by easing the terms of public financing (*the government budget constraint channel*).

How intensively the various channels are activated depends on the type of financial assets purchased, the structural characteristics of the economy, and the cyclical phase. In particular, the relative importance of some transmission channels in the euro area and in Italy may be different from that observed elsewhere in the past, given the predominant role of the banking system in financing the economy.

2.2.1 Yields of other assets

In order for the purchase programme to influence the decisions of firms and households it must have an impact on the prices of a broad range of assets, not just those bought directly

⁶ In a 'corridor' system, the central bank sets three interest rates: that on open market operations for refinancing banks (for the Eurosystem, the rate on Main Refinancing Operations, MRO); the rate banks receive for liquidity above the reserve requirement (the deposit facility rate); and the rate at which banks can ask for overnight liquidity from the central bank (for the Eurosystem, the marginal lending facility rate).

⁷ If there is a liquidity shortage, the money market overnight rate converges on the marginal lending rate, the highest of the three interest rates that the central bank sets. Where liquidity is neither scarce nor in excess, the overnight rate converges on the MRO rate, which is generally higher than the rate on overnight deposits but lower than that on marginal lending.

(*the portfolio-balance channel*). First of all, spillovers are determined by arbitrage considerations of investors: a change in the risk-free component and the term premiums of the purchased assets is passed on to the present stochastic discounted value of any multiple-period cash flow underlying the formation of financial and real (e.g. real estate) asset prices. Moreover, by improving economic prospects, the purchase programme helps to bring down credit risk premiums because it reduces the probability of default for a wide variety of issuers (both public and private sector).

The empirical evidence for the United States indicates that the long-term Treasury securities purchase programme undertaken by the Federal Reserve in March 2009 caused yields on corporate bonds to come down by about the same amount as on the Treasury securities included in the programme. Similar evidence is found for the United Kingdom, where the Bank of England's purchases of government securities have encouraged institutional investors to modify their portfolios substituting government with corporate bonds, with much the same effect on the yields on the two securities.⁸

The empirical evidence regarding the spillovers on the stock market is less clear. On the one hand, flow of funds statistics reveal that private investors in the US and UK do not seem to have increased their holdings of domestic equities in the wake of the asset purchases, suggesting that equities are an imperfect substitute for government bonds. On the other hand, there are indications that the rise in equity prices observed after the purchase programme was announced was partly due to the expectation of higher profits and better funding conditions, favoured by the purchase programme.

2.2.2 Exchange rate

The replacement of assets available on financial markets with central bank reserves and the reduction in long-term interest rates lead to a depreciation of the currency (*the exchange rate channel*). When global financial markets are closely integrated, investors tend to alter their portfolios, by purchasing not only assets issued in their domestic currency but also foreign currency securities.

The long-term securities purchase programmes of the Federal Reserve, the Bank of England, and the Bank of Japan show evidence of a significant impact on their respective exchange rates.⁹

2.2.3 Bank lending

Both the quantity and the cost of credit can be affected by a securities purchase programme through several channels.

First of all it affects the interest rates on new loans. Insofar as the average interest rate applied to new loan contracts depends on medium- and long-term interest rates for the portion of fixed rate contracts and on short-term rates for the variable rate portion of loans,

⁸ For evidence relating to the United States see, for example, Gagnon et al. (2011); for the United Kingdom see Joyce et al. (2014).

⁹ Evidence for the United States varies with the programmes: the dollar appreciated after the first securities purchase programme (QE1) owing to the large inflow of emerging countries' investments to the US equity and bond markets; the dollar instead depreciated after the second programme (QE2) as a result of the large outflow of capital. Overall, Fratzscher et al. (2013) conclude that about a third of the dollar's loss of value between 2007 and 2011 was due to the Federal Reserve's policies.

the direct impact of the purchase programme on the average cost of new loans will depend on both the relative share of fixed and variable rate contracts and the size of the variation in interest rates at different maturities (*the interest rate channel*).

On the supply side, the increased value of the securities in banks' portfolios should also affect their costs of funding and, in turn, credit standards and terms and conditions for loans to firms and households. Moreover, the improvement in banks' profitability resulting from capital gains on securities sold to monetary authorities could strengthen the degree of capitalisation and liquidity of financial intermediaries and help to reduce their funding costs, further sustaining the expansion of bank credit (*the bank lending channel*). Where the programme is introduced in the wake of a strong financial crisis, the effect of the increase in banks' profitability on credit supply could, however, be held back by the high level of borrowers' riskiness and by the process of banks' deleveraging.

Finally, an additional indirect effect on lending may come from the expansion of economic activity and the increase in the net wealth of households and firms, enabling them to step up their recourse to external financing and reducing their riskiness (*the balance sheet channel*).

2.2.4 Public finance

Lastly, the purchase of financial assets tends to have a positive impact on the public finances, as the reduction in the yields on sovereign debt implies lower debt servicing costs (*the government budget constraint channel*).

2.3 The transmission to the real economy

The reduction in long-term interest rates and its transmission via the financial and credit markets affect firms' and households' spending decisions and therefore also the volume and prices of goods and services produced and consumed, as well as employment and wage levels.¹⁰

The reduction in the cost of finance described in the previous section affects firms' and households' intertemporal decisions (*the intertemporal substitution effect*). Households are encouraged to borrow more or to save less, and to increase current consumption; firms are encouraged to invest more.¹¹ The overall effect is an aggregate demand increase.

The depreciation of the currency makes domestic goods relatively less costly than those of foreign competitors and trading partners and so improves the price competitiveness of goods produced in the country or area where the securities purchase programme is carried out; this has an expansionary effect on domestic and foreign demand for these goods (*the competitiveness effect*).

Increasing the prices of financial and real assets has an expansionary effect on aggregate demand by directly increasing the wealth of holders (*the wealth effect*). The effectiveness of this channel depends on the size and composition of households' and firms' portfolios.

¹⁰ These effects occur even when the central bank operates with the conventional monetary policy instrument of official interest rates. The degree of the real economy's response to conventional and unconventional policies may differ, however.

¹¹ On one hand, a reduction in interest rates means a greater increase in households' utility from consuming one additional unit of income today than from saving it and consuming in the future; on the other hand, the real cost to firms of an additional unit of capital diminishes.

Lastly, the stronger the purchase programme's effect on firms' and households' expectations and confidence, the greater the overall effect on aggregate demand and hence on price dynamics.

3. The Eurosystem's expanded asset purchase programme and the effects on the Italian economy

This section focuses on the Eurosystem's expanded asset purchase programme (APP). We describe the economic context in which the programme was put in place and its main features. We provide a preliminary assessment of its potential effects on Italian economic activity and inflation, via the transmission channels described in the previous section.

3.1 The economic environment

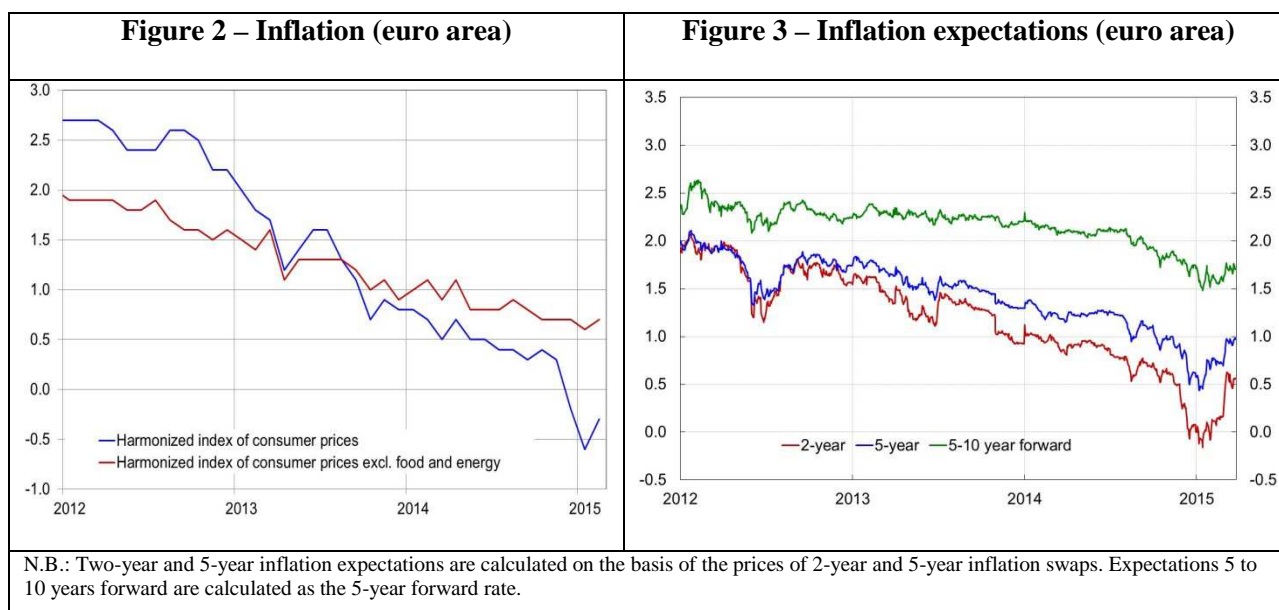
During 2014, consumer price inflation in the euro area fell well below the ECB's definition of price stability, even excluding the more volatile components, continuing a trend that was already well under way in the previous year (Figure 2); economic activity continued to expand at an extremely slow pace. The risk of a de-anchoring of inflation expectations and the onset of a deflationary spiral increased (Figure 3). The ECB Governing Council lowered official interest rates, bringing them to the effective lower bound in September. During the summer it also put in place a comprehensive package directed at supporting bank lending to the economy and at easing financial conditions.

This package included the targeted longer-term refinancing operations (TLTROs) introduced in June and carried out since September, which linked favourable refinancing conditions to an expansion in bank credit, the asset-backed securities purchase programme (ABSPP) and the covered bond purchase programme (CBPP3) announced in September and launched the following month, which aimed at supporting specific market segments that play a key role in the financing of the economy, further enhancing the functioning of the monetary policy transmission mechanism.

In January 2015, the Governing Council judged the economic stimulus deriving from the monetary policy measures taken in June and September 2014 to be insufficient. Although these had helped to reduce private sector borrowing costs significantly, in particular lowering bank lending rates to non-financial corporations, the new measures did not result in a sufficient expansion of the Eurosystem's balance sheet, due to the lower than expected outturns in the first two TLTROs and a relatively modest contribution from the covered bond and, especially, the ABS purchases. At the beginning of 2015, the size of the Eurosystem's balance sheet was around €2.2 trillion, about €1 trillion below the peak reached in 2012. As a result, the overall transmission of the measures to the broader financing conditions of the economy proved weaker than was foreseen in the original setup of the package. These measures thus fell short of providing adequate support to inflation in the medium term. Inflation expectations continued to signal a return to values close to 2 per cent only in the very long term. Overall, there was an increased risk that the sequence of negative surprises on inflation (including core inflation) would affect price formation, triggering second round effects and a de-anchoring of inflation expectations.

For these reasons, and there being no room for further reductions in official interest rates, the Governing Council announced on 22 January 2015, in accordance with its mandate to maintain price stability, the Expanded Asset Purchase Programme, which encompasses the

existing purchase programmes for asset-backed securities and covered bonds, as well as purchases of public sector securities (Public Sector Purchase Programme, PSPP).



3.2 The size and composition of the programme

From the 9th of March 2015 onwards, and at least until September 2016, the ECB and the NCBs will purchase on the secondary market €60 billion a month, for a total of €1,140 billion, which corresponds to around 50 per cent of the Eurosystem's balance sheet assets at the time of the decision and to around 11 per cent of euro-area GDP in 2014.¹² Purchases will in any case continue to be conducted until the Governing Council sees a sustained adjustment in the path of inflation that is consistent with its objective of achieving inflation rates below, but close to, 2 per cent over the medium term.

The programme includes purchases of (i) ABS and covered bank bonds under the ABSPP and the CBPP3, and (ii) securities issued by euro-area central governments, certain public agencies in the euro area, and some European institutions, under the PSPP.

Purchases under the PSPP, in particular, will be spread among the national central banks (NCBs) according to their shares in the ECB capital (capital keys).¹³ Part of the purchases, about 8 per cent, will be made by the ECB itself; a further 12 per cent, consisting of securities issued by European institutions,¹⁴ will be made by the NCBs. These two components, which together are 20 per cent of the purchases under the PSPP, will be subject to a regime of risk sharing. The balance sheets of the individual NCBs will bear the entire risk of losses on the remaining 80 percent of purchases. A specialisation approach is applied

¹² In comparison, the Federal Reserve, the Bank of England and the Bank of Japan expanded their balance sheets by 22, 21 and 32 per cent of GDP respectively as a consequence of their own asset purchase programmes.

¹³ Italy's share is about 17.5 per cent. The share has been recalculated to exclude the capital keys of the central banks of non-euro-area central banks, which do not take part in the PSPP.

¹⁴ International and supranational institutions located in the euro-area that appear on a special list published on the ECB's website (<https://www.ecb.europa.eu/mopo/liq/html/pspp.en.html>).

to this component, meaning that each NCB will buy securities issued by its own government.¹⁵

Regarding asset eligibility, securities must be acceptable as collateral in the Eurosystem refinancing operations and must have a remaining maturity comprised between 2 and 30 years.¹⁶ Purchases of nominal marketable debt instruments at a negative yield to maturity are permissible as long as the yield is above the deposit facility rate. Limits have been placed on the amount of purchases so as not to distort the process of market price formation and so as to avoid any impediments to the application of collective action clauses (CAC)¹⁷ that might arise as a result of the NCBs gaining majority stakes through their purchases.¹⁸ Finally, in order to support bond and repo market liquidity without unduly curtailing normal repo market activity, the securities purchased under the PSPP are made available for securities lending in a decentralised manner by NCBs.

Under the PSPP the Bank of Italy will purchase just over €130 billion of Italian government securities; the figure rises to about €150 billion including the ECB's operations. This is equal to around 9.5 per cent of the outstanding Italian public debt at the end of February 2014, at market prices, and 9.1 per cent of 2014 GDP.¹⁹

3.3 The effects on the Italian financial system

The impact of the APP on the Italian economy is assessed using the Bank of Italy's econometric model.²⁰

Estimates of the impact on the main macroeconomic variables crucially depend on the assumptions regarding the direct effect on yields of the securities purchased and on the exchange rate. To this extent we rely not only on our own analyses but also on the empirical evidence for similar measures adopted in the past by the Federal Reserve, the Bank of England and the Bank of Japan. The estimated effects are compared with those effectively observed in financial markets between the 6th of November 2014 – when the Governing Council announced it had assigned ECB staff and the competent Eurosystem committees to complete the preliminary work for the launch of the APP – and the 10th of April 2015 – last available observation. Accordingly, although the programme also includes purchases of private securities under the ABSPP and the CBPP3 announced by the Governing Council in

¹⁵ Part of these purchases relates to bonds issued by euro-area government agencies. The preliminary list, which may be revised by the Governing Council, is published on the ECB's website (<https://www.ecb.europa.eu/mopo/liq/html/pspp.en.html>).

¹⁶ Debt instruments must meet the high credit rating standards established by the Eurosystem Credit Assessment Framework (ECAAF). The minimum requirement for government securities is level 3 in the Eurosystem's harmonized rating scale, which corresponds to a long-term rating of BBB- by Fitch or Standard & Poor's, Baa3 by Moody's or BBB by DBRS. Requirements for asset-backed securities are stricter, with a minimum acceptable rating of AAA at issue.

¹⁷ Collection action clauses, which were introduced in the EU under the Treaty Establishing the European Stability Mechanism and transposed into Italian law by Decree 96717/2012, allow a qualified majority of investors to make changes to the payment terms of a security that are legally binding for all holders of that security; this facilitates orderly restructuring of the debt.

¹⁸ Purchases may not exceed 25 per cent of the value of the single issue or 33 per cent of the debt issued by each national government and public agency or by European institutions. Compliance with the two caps will be assessed taking account of the total volume held by the Eurosystem, also for purposes other than monetary policy, including securities held in the NCBs' investment portfolios.

¹⁹ The share is calculated on the stock of government securities at 27 February 2015, excluding debt with residual life of less than 2 years and more than 30. The share amounts to 11.6 per cent when evaluated at nominal or face values.

²⁰ For a concise description of a recent version of the model, see Busetti, Locarno and Monteforte (2005).

September 2014, it is assumed that only with the start of the preparations for the PSPP there was a significant activation of the transmission channels described above.

3.3.1 The yields of the assets purchased

In order to compute the potential impact of the programme on yields of purchased securities, we assume that purchases of 1 per cent of the outstanding amount of government bonds issued in the euro area reduce their yields by 5.8 basis points in the long run. This value is the average of the semi-elasticities estimated in various studies on the effects of the asset purchase programmes in the United States.²¹ Since we focus on the Italian economy, we rescale this semi-elasticity by the ratio between the yield of Italian government bonds and the average of the yields of the 10 largest countries in the euro area observed before the programme was announced. We obtain a semi-elasticity on Italian government bonds equal to 9.2. Since the volume of purchases of Italian government bonds relative to the stock of outstanding amount of Italian government bonds is equal to 9.5 per cent, the estimated reduction of long-term interest rates for Italian government securities would be about 85 basis points.

Between November 2014 and April 2015, sovereign yields fell across all maturities; those at 10 years for Italy fell by approximately 115 basis points (Table 1).²² The variations in prices and interest rates also affected many other financial assets. In particular, there was a significant reduction in the yields on bonds issued by non-financial corporations with investment grade credit ratings, i.e. at least ‘BBB’. This reduction, consistently with the portfolio rebalancing channel, is smaller than that observed for government securities with corresponding maturities, which testifies to the imperfect substitutability between financial assets with different risk-return profiles. Equally significant is the appreciation of share indexes, also in this case because investors needed to rebalance their portfolios towards higher risk-return profiles. Lastly, in line with the signalling channel, the reduction of the rates on overnight indexed swaps (OIS) at various maturities demonstrates a marked lowering of expectations on future monetary policy rates.²³

3.3.2 The exchange rate

The impact on the euro’s exchange rate is computed under the assumption that an increase of €100 billion in Eurosystem balance-sheet corresponds to a 1.0 per cent depreciation of the euro against 18 trading partners. This semi-elasticity is consistent with the empirical evidence observed during the global financial crisis when similar programmes were adopted by major central banks and with the experience of the ECB in the years of the sovereign debt crisis.²⁴ For example, between the start of the second quarter of 2011 and the end of the second quarter of 2012, the Eurosystem’s balance sheet increased by about €1.2 trillion, in

²¹ The studies used to calculate this average elasticity were: Cahill, D’Amico, Li, Sears (2013), Krishnamurthy and Vissing-Jorgensen (2012), Hamilton and Wu (2012), Gagnon, Raskin, Remache, Sack (2011), and Christensen-Rudebusch (2012). For Italy, see also Table 3 in Casiraghi et al. (2013).

²² In this period, interest rates were also affected by other factors. For example, in April, uncertainties over the evolution of the crisis in Greece also led to high volatility of interest rates on government securities in the other euro-area countries.

²³ The OIS rate is an average reference interest rate for overnight operations conducted on the European interbank market. Aside from negligible premiums for the credit and liquidity risk in overnight operations, the OIS rate therefore incorporates operators’ expectations for the development of the official monetary policy rate.

²⁴ See Deutsche Bank “Quantitative euphoria”, *Focus Europe*, 23 January 2015, and “Push vs. Pull: ECB balance sheet and the euro”, *Focus Europe*, 19 September 2014.

large part as a consequence of the government securities' purchases carried out under the Securities Markets Programme (SMP) and the two three-year longer-term refinancing operations implemented at the end of December 2011 and in March 2012. In the same period, the euro depreciated by 11 per cent against its main partners.

Based on this assessment we assume the APP will cause a depreciation of the euro with respect to the US dollar of 11.4 per cent. For Italy, given the large share of foreign trade accounted for by other euro-area countries, other things being equal we estimate a corresponding gain in price competitiveness of about 6.5 per cent.

This estimate is subject to a high degree of uncertainty. Past experiences show that, when unconventional monetary policy measures are implemented, exchange rate developments may reflect the interplaying of different factors. These include the speed of consolidation of the economic recovery and the monetary stance that investors expect, both inside the countries where the programme is adopted and in the main trade partner's economies.²⁵

It should also be noted that in addition to the change of the size of the central bank balance sheet, other things being equal, another important factor to explain the relative strength of one currency is changes in sovereign risk premia. Thus, for example, between the second quarter of 2011 and the end of the second quarter of 2012, when the Eurosystem's balance sheet expanded by about €1.2 trillion, risk premia on sovereign bond of some of the euro-area countries most affected by the crisis increased substantially, contributing to the weakening of the euro.

Between 6 November 2014 and April 10 2015, the change in the euro's exchange rate against the main trading partners was approximately 10 per cent, roughly in line with our estimates.

3.3.3 Bank lending

By our estimate, the purchase programme will determine an immediate reduction of about 20 basis points in the average cost of new loans to firms and 35 basis points on loans to households. This cost is a function of medium- and long-term rates as far as fixed rate loans are concerned and short-term rates for the portion at variable rates. The estimates therefore depend on how rates at different maturities react to the programme and on the relative weights of fixed and variable rate loans. In particular: (i) The cost of fixed rate loans responds quickly to falling long-term rates, which react more sharply to securities purchases, coming down by practically the same amount; (ii) on the other hand, the cost of variable rate loans changes very little in the short run, as the short-term rates to which it is indexed were already extremely low even before the programme was announced and will benefit only modestly from the further increase in liquidity induced by the securities purchases; (iii) the share of fixed term loans is very low: at the end of February 2015, 98 per cent of total gross lending flows to non-financial firms in Italy were at variable rates or at fixed rates with maturity of less than one year (in the euro area, 90 per cent); in the case of home mortgage loans, the share was 70 per cent in Italy and 25 per cent in the euro area.

²⁵ For example, between 2008 and 2014, the US dollar appreciated substantially during the first purchase programme (QE1), while the opposite occurred during the second programme (QE2). During the third programme (QE3) the dollar again appreciated slightly. The effect was arguably attributable to the consolidation of the economic recovery and investors' expectations of a further improvement in macroeconomic conditions.

An additional, indirect stimulus from the reduction in lending rates could come from the improvement in banks' funding conditions. This effect might be especially relevant in the countries hit hardest by the sovereign debt crisis, insofar as the narrowing of sovereign spreads will further facilitate banks' access to wholesale funding.

In the United Kingdom it has also been observed that the programme of quantitative easing may contribute, through the increase in bank reserves and deposits, to increasing the supply of credit.²⁶ The evaluation of the effects of the PSPP on interest rates and bank lending must also take account of such other measures of the ECB Governing Council to strengthen the monetary policy transmission mechanism as targeted longer-term refinancing operations (TLTROs).²⁷ On the one hand the liquidity coming from the purchases could reduce banks' recourse to the TLTROs; on the other, the lowering of the interest rates on the securities purchased and the consequent shift in the banks' portfolio towards higher-yielding assets, such as loans to non-financial corporations, could prompt additional requests for TLTRO financing.

We should also consider the potential improvement in banks' earnings and capital adequacy determined by the purchase programme. This effect depends first of all on the possible impact on profits and capital ratios, hence on the terms of banks' lending to borrowers, resulting from the changes in interest rates and in the exchange rate of the euro, the increase in the value of the banks' securities portfolios, and the increased demand for credit in connection with the improving economic conditions. The impact can be estimated using the methodology set out by Albertazzi et al. (2012) and the Bank of Italy econometric model. The results – surrounded, to be sure, by considerable uncertainty – indicate that the purchase programme will increase banks' profits by €1.7 billion over two years (€300 million in 2015 and €1.4 billion in 2016). Net interest income would contract in 2015 owing to a fall in long-term rates, which would entail a decline in lending rates not offset by a reduction in deposit rates, which are already near zero. From 2016 on, however, the expansion in the volume of credit induced by faster economic growth would help to increase net interest income.

3.3.4 Household wealth

Operating through the improvement in private sector balance sheets brought about by the purchases, this channel is probably weaker in the euro area than in the United States or the United Kingdom, given the much smaller share of financial assets held by Europe's households and firms.²⁸ Estimating its effects – which may not be negligible over the longer term – is no easy task, partly because they will depend on how fast and how strongly the purchase programme is reflected in the prices of the other financial assets (see Section 2.2.1). So even though share prices posted significant gains following growing expectations of intervention and the actual launch of the PSPP (Table 1), we do not assume any autonomous effect through this channel on consumption expenditure by households²⁹ or on investment

²⁶ See Joyce and Spaltro (2014).

²⁷ Launched in September 2014, the TLTROs give credit institutions quarterly access, until June 2016, to Eurosystem refinancing on particularly advantageous terms, conditional on their expansion of lending to firms and households (excluding home purchase mortgages) above a benchmark specific to each bank. The banks must repay the funds so obtained in September 2018 or else in advance, in September 2016, if their lending growth from May 2014 to April 2016 is not better than the benchmark.

²⁸ For example, in 2012 the share of net financial assets as a proportion of total household wealth was 32 per cent in Germany, 27 per cent in France, and 33 per cent in Italy, against 65 per cent in the United States (OECD Economic Outlook, 2014).

²⁹ Equally, while there is evidence of a rise in US stock markets following the implementation of the purchase programmes by the Federal Reserve, the impact of the increase in financial wealth on consumer spending is not clearly identified in the studies available to date.

spending by firms. This accordingly represents an upside risk for our estimates of the macroeconomic impact of the programme.

Table 1 – Changes in the main financial variables

		Values at	Variations			
		5 Nov. 14	Preparatory work (A)	Announcement (B)	Launch (C)	Total (1)
Overnight interest rates (2)	Euro area, 3-mth OIS	-0.03	-0.03	-0.01	-0.03	-0.07
	Euro area, 1-yr OIS	-0.05	-0.05	-0.02	-0.03	-0.09
	Euro area, 3-yr OIS	-0.02	-0.04	-0.02	-0.06	-0.11
Govt. Securities yields (2)	Euro area, 1-yr maturity	0.1	-0.11	-0.07	-0.04	-0.21
	Euro area, 3-yr maturity	0.3	-0.16	-0.15	0.00	-0.31
	Euro area, 5-yr maturity	0.6	-0.21	-0.14	0.00	-0.36
	Euro area, 10-yr maturity	1.5	-0.50	-0.17	-0.14	-0.81
	Euro area, 30-yr maturity	2.6	-0.63	-0.40	-0.30	-1.33
	Italy, 1-yr maturity	0.4	-0.12	-0.14	-0.07	-0.33
	Italy, 3-yr maturity	0.9	-0.37	-0.28	0.03	-0.62
	Italy, 5-yr maturity	1.2	-0.44	-0.25	0.04	-0.65
	Italy, 10-yr maturity	2.4	-0.74	-0.37	-0.04	-1.16
	Italy, 30-yr maturity	3.8	-0.67	-0.82	-0.20	-1.69
BTP/Bund spread (2)	At 10 years	1.6	-0.37	-0.31	0.18	-0.50
Euro-area inflation expectations (2)	Swap contracts at 1 year	0.72	-0.08	0.11	0.17	0.21
	Swap contracts at 5 years	1.84	-0.18	0.07	-0.07	-0.18
	Swap contracts at 10 years	2.03	-0.20	0.07	-0.09	-0.23
	Swap contracts at 5-10 years	1.85	-0.18	0.06	-0.06	-0.18
Real interest rates	At 2 years	-0.4	0.47	-0.60	-0.34	-0.48
	At 5 years	-0.5	0.22	-0.32	-0.30	-0.40
	At 10 years	-0.4	0.00	-0.21	-0.31	-0.52
Private bond yields (2)	Euro area firms with AA rating (7-10 yrs)	1.1	-0.25	-0.05	-0.08	-0.39
	Euro area firms with BBB rating (7-10 yrs)	2.2	-0.27	-0.17	-0.08	-0.51
	Covered bonds with AA rating	0.6	-0.05	-0.02	-0.15	-0.22
Stock markets (3)	Eurostoxx	312	6.9	11.0	5.8	25.5
	FTSE MIB INDEX	19428	2.8	12.3	6.4	22.9
Exchange rates (3),(4)	USD/EUR	1.2	-7.1	-5.4	-3.6	-15.3
	Nominal effective exchange rate	99.4	-4.3	-3.5	-2.3	-9.8

Source: Based on Datastream and Bloomberg data.

N.B.: Changes are calculated on the following periods: Preparatory work = from 5 November 2014 to 21 January 2015; ECB announcement = from 21 January 2015 to 6 March 2015; PSPP Launch = from 6 March 2015 to 10 April 2015; Total = from 5 November 2014 to 10 April 2015. (1) Any discrepancies are due to rounding. (2) Percentage points and absolute changes. (3) Levels and percentage changes. (4) Negative change = depreciation. The nominal effective exchange rate is the exchange rate of the euro against 18 trading partners.

3.3.5 The other channels

The programme is expected to benefit foreign demand within the euro area. In particular, given the importance of trade between euro-area countries, a strengthening of economic activity in each will be reflected in demand for goods from trading partners (the intra-area trade spillovers channel). We estimate the potential increase in euro-area demand for Italian products at around 1 percentage point in 2015-16, induced by the better growth prospects of the other euro-area countries.³⁰

It is difficult to quantify the effects of the PSPP on private sector inflation expectations and confidence. Regarding the former, especially following the ECB Governing Council's announcement of the programme, there is evidence that the decline under way since the second half of 2014 in medium and long-term inflation expectations as gauged by the financial markets (e.g. those implied by swap rates) has come to a halt (see Table 1).

³⁰ This estimate was obtained using the elasticities implicit in the quantitative models of the Eurosystem NCBs. For a description of the method, see *A Guide to Eurosystem Staff Macroeconomic Projection Exercises*, available at <https://www.ecb.europa.eu/pub/pdf/other/staffprojectionsguideen.pdf>.

The latest surveys also suggest that inflation expectations have stabilized.³¹ Along with the reduction in nominal rates associated with the PSPP, the stabilization of expectations is helping to lower real interest rates further (see Table 1). However, given the weakness of the evidence available to date, in our macroeconomic assessment of the programme's impact we assume there is no effect through this channel.

During the recent months improvements in both firms' and households' confidence have also occurred, but for the purposes of this paper it is still difficult to identify an effect attributable solely to the recent measures taken by the Eurosystem.

Finally, in quantifying the macroeconomic impact of the securities purchase programme, lower public debt service costs are assumed to be allocated entirely to reducing net borrowing and accordingly to have no direct impact on demand and output growth.

3.4 The effects on Italian GDP and inflation

We estimate the macroeconomic impact of the public securities purchase programme by evaluating the effects on the main channels listed in the previous section, which for convenience are summarized in Table 2. According to our estimates, the programme should have a positive impact on Italian GDP levels of 0.5 percentage points in 2015 and a cumulative effect of 1.4 percentage points in 2015-2016. We expect the programme to increase inflation by just above 0.5 percentage points in 2015 and 0.7 in 2016, even if forecasts that include the effects of the programme remain surrounded by a high degree of uncertainty. This is also accentuated by risks in geopolitical conditions and their possible impact on world trade, oil prices and exchange rates.

Concerning the contribution of the different channels, we estimate that most of the increase in the dynamics of GDP and prices will come from the exchange rate depreciation and the reduction in the yield on long term government bonds.

Through the exchange rate channel it is estimated that the financial asset purchase programme will boost economic activity in Italy by almost 1 percentage point in 2015-16. The depreciation of the euro will be reflected in particular in exports, which will increase by almost 4 percentage points in the two years. The strengthening of exports owing to increased economic activity will also favour investment, which will expand by over 2 percentage points, making a significant contribution to aggregate demand.

The decline in long-term interest rates and the improvement in banks' lending conditions will lead to an increase in expenditure by households, who will find saving less advantageous, and by firms, which could take advantage of the lower cost of capital to invest more. The increment in consumption is projected at almost half a point overall in 2015-16 and that in investment at over one point. All in all, this channel could augment GDP by a further half-point in 2015-16. Additional expansionary effects on economic activity will come from increased intra-area foreign demand.

The impact on prices will come almost entirely through the exchange rate channel. Aside from the direct contribution of the exchange rate to imported inflation, the expected rise in profit margins thanks to the acceleration of economic activity and greater price competitiveness owing to the depreciation of the euro will also have an effect. The cumulative improvement in price competitiveness in the two years is estimated at 3 percentage points.

³¹ See Survey on Inflation and Growth Expectations. December 2014, in Supplements to the Statistical Bulletin, No. 2, 2015, and the ECB Survey of Professional Forecasters for the first quarter of 2015.

Table 3 – Quantifying the effects of the PSPP on GDP and inflation through the main transmission channels

Transmission channels	GDP growth		HICP Inflation	
	2015	2016	2015	2016
<i>Portfolio-balance channel e signaling channel:</i>				
- Impact on yields of 10-year government securities	-85 bp			
	0.1 pp	0.3 pp	0.0 pp	0.0 pp
<i>Interest rate channel:</i>				
- Impact of bank rates on lending to households	-34 bp			
- Impact of bank rates on lending to firms	-18 bp			
<i>Exchange rate channel:</i>				
- Depreciation of the €/€ exchange rate	11.4%			
- Depreciation of the nominal effective exchange rate	6 %	0.4 pp	0.5 pp	0.5 pp
<i>Intra-area trade spillovers channel:</i>				
- Changes in foreign demand in other euro-area countries	1%	0.1 pp	0.1 pp	0.0 pp
Total impact		0.5 pp	0.8 pp	0.5 pp
			0.7 pp	

Source: Banca d'Italia.

NB: Cumulative effects on the yields of government securities, bank rates, the exchange rate, and trade-weighted foreign demand in 2015-16; bp indicates basis points and pp, percentage points; any discrepancies between the total impact and sum of the individual effects are due to rounding.

On the whole our estimates of the macroeconomic effects are comparable to those obtained in studies of the private and public-sector securities purchase programmes conducted in the United States and the United Kingdom.³² For the sake of comparison, taking into account the different size of the programmes, we get average impacts on GDP and inflation that are very close to the results for Italy.³³ However, these results are produced by averaging a series of sharply divergent values, denoting severe uncertainty about the effects. In the many studies carried out in the United States, for example, estimates of the effects on GDP and inflation range from a minimum of around one seventh to a maximum of around twice the average impacts.

This acute uncertainty is mostly attributable to the fact that the securities purchase programmes mark a considerable departure from central banks' traditional policy action. Another source of uncertainty in estimating the macroeconomic effects is that most of the transmission channels involve changes in the prices and yields of a large array of financial assets, whose links with the macroeconomic variables is only partially factored into most of the quantitative models ordinarily used by the main central banks.³⁴

³² Williams (2014) and Joyce et al. (2011) review a number of studies assessing the macroeconomic impact of the securities purchase programmes of the Federal Reserve and Bank of England respectively.

³³ The average impact of purchases worth 1 percentage point of GDP would come to around 0.15 additional percentage points of GDP for Italy, as for the United Kingdom and the United States; the impact on inflation would be marginally greater in Italy and the United States (around 0.14 percentage points) than in the United Kingdom.

³⁴ In almost all the studies available the first stage in estimating the effects of the purchase programmes consists in evaluating the impact on prices and yields; these assessments rely on satellite models. The variations obtained in this way, estimated using very different methodologies, are then used in a second phase as

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'technical assumptions' in the structural macroeconomic models to quantify the impact of the purchases on GDP and inflation.