

# Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

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*At the start of 2015, the European Central Bank (ECB) decided to extend its programme of asset purchases to include government debt, a move widely anticipated by the financial markets in H2 2014. This programme of quantitative easing, on a scale never before seen in the Eurozone, echoes the non-standard monetary policies adopted by other prominent central banks. The effects of this policy are felt in two main ways: a decline in interest rates, and the depreciation of the Euro.*

*By boosting the liquidity holdings of the banks, this programme drives down interest rates, which stimulates investment and economic activity throughout the Eurozone. Furthermore, buying up government debt serves to reduce financial fragmentation: the sovereign rates of peripheral nations have fallen more substantially than those of the core Eurozone economies, providing extra impetus for investment, particularly in Italy and Spain. Considering both the direct impact and the indirect impact felt via neighbouring countries, the fall in interest rates which can be attributed to the non-standard policy adopted by the ECB could contribute as much as +0.2 points to France's economic growth in 2015. If the banks were to free up and lend some of their substantial excess liquidity, currently invested with the ECB, then the resulting effects on investment and consumption could amplify the general positive impact on growth. This development goes hand in hand with the substantial depreciation of the Euro, which can be largely ascribed to the economic policy adopted. This depreciation has allowed France to recover some of its share of the export market, and is expected to contribute around +0.2 points to growth in 2015. All in all, the decline in interest rates caused by quantitative easing combined with the depreciation of the Euro observed thus far appears to have bolstered economic activity by +0.4 points in 2015.*

*Without taking into account the effects on the flow of lending, in France the principal beneficiaries of this programme have been general government and non-financial corporations, at the expense of financial corporations and non-residents. As for households, the positive impact for borrowers in 2015, accentuated by successive waves of mortgage renegotiations and buy-backs since the start of the year, appears to be less significant than the corresponding losses sustained by savers. This dynamic should be inverted in 2016, all other things being equal.*

*The ECB's quantitative easing may also serve to increase the prices of both financial and real-estate assets. Nevertheless, it would appear that in reality the programme has not had a significant impact in this respect.*

## Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

### The ECB's quantitative easing programme came later and on a lesser scale than the programmes put in place by other central banks

*An initial plan to buy up 1,100 billion Euros of public and private securities*

In late January 2015 the European Central Bank (ECB) announced its intention to substantially increase purchases of assets, including sovereign bonds. This announcement followed the various non-standard measures introduced in 2014, albeit on a lesser scale and explicitly ruling out any purchases of sovereign bonds (Box 1).

*A programme that arrives later and on a more limited scale than the actions taken in the United States, Japan and the United Kingdom...*

Since March 2015, the ECB has been buying up 60 billion Euros' worth of assets each month. This quantitative easing programme, initially expected to continue until September 2016, will now run until at least March 2017, and until such time as the Governing Council observes a lasting recovery in inflation rates. All in all, the total value of the programme considered here should amount to just over 1,100 billion Euros, equivalent to 12 GDP points, over the period March 2015 to September 2016. The extension announced on 3 December 2015, which will see the programme run until March 2017, is not analysed in this report. The ECB's balance sheet should thus increase gradually and return to its 2012 level by mid-2016.

*A clear objective: stimulate activity and steer inflation back towards its target level*

This decision from the ECB comes several years after the quantitative easing (QE) programmes put in place by other major central banks following the financial crisis of 2008. In the United States, the Federal Reserve (Fed) bought up over 3,000 billion dollars in public securities between 2008 and 2014, equivalent to 18 GDP points. In the United Kingdom, the Bank of England (BoE) bought up 375 billion pounds' worth of public securities between March 2009 and November 2012, equivalent to around 21 GDP points. Finally, the Bank of Japan (BoJ) implemented a similar programme in April 2013. The BoJ is currently purchasing 80,000 billion yen per year; since this programme came into force the BoJ's monetary base has increased by 39 GDP points. The ECB programme is thus less substantial, proportionally to GDP in the Eurozone, than the quantitative easing policies adopted by the Fed, the BoE and the BoJ.

The ultimate objective of the quantitative easing policy adopted by the ECB is to steer inflation back towards its target level ("below, but close to, 2%"), in a context where key interest rates are already virtually zero. To do so, asset purchases will be primarily aimed at stimulating activity, boosting productive capacities and allowing prices to rise again. One of the aims of this report is to assess the effects of the fall in interest and exchange rates on the economy, effects which have been in full force since quantitative easing was introduced. But other channels are also at work here, such as bank lending and asset prices.

### Quantitative Easing by the ECB has driven down interest rates

*The first channel through which its effects are felt is a drop in interest rates*

Interest rates represent the first channel through which the effects of the ECB programme are naturally passed on to the economy as a whole. Firstly, the mechanical effect of the increase in the ECB's balance sheet is greater liquidity available to banks. This liquidity injection has a direct effect on the interbank interest rates, which serve as the reference point for interest on short-term loans. A fall in these rates then spreads to long-term interest rates via anticipatory mechanisms. Indeed, the long-term rate can be understood as the sum total of expectations regarding successive short-term rates. A reduction in short-term rates which is expected to last will lead to a lowering of expectations concerning the successive short-term rates, and hence to a reduction in long-term rates. Furthermore, by emphasising the scale and duration of this high-profile programme the ECB has ensured that market forces are well aware of the central bank's intention to adopt an accommodating monetary policy for the foreseeable future, thus influencing long-term interest rates.

# Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

## Box 1 – The ECB’s non-standard policies and market expectations

The expansion of the European Central Bank’s (ECB) programme of quantitative easing had been widely anticipated by the markets since early summer 2014, and these expectations continued to evolve up until early 2015.

Although the ECB did not officially unveil its sovereign debt purchasing policy until January 2015, sovereign yields started to decline well before then, in mid-2014, and the Euro began to depreciate in summer 2014.

Non-standard measures had been mooted as early as the spring of 2014, followed on 5 June by the announcement of the asset-backed security programme (ABS), as well as targeted longer-term refinancing operations (TLTRO). Mr. Draghi also announced that extending the bank’s purchasing programmes to other forms of assets was among the options being considered by the ECB’s monetary policy committee. In August 2014, the ECB renewed its Covered Bonds purchasing programme. On 4 September 2014, Mr. Draghi indicated that several members of the ECB’s monetary policy committee were in favour of more substantial quantitative easing.

Although at that stage the ECB explicitly ruled out buying government debt, the success of these initial programmes was limited to say the least, leading to a growing sense of expectation on the markets that a large-scale quantitative easing programme was on the way, including sovereign debt purchases.

These expectations were stoked by the public declarations of the members of the bank’s Governing Council, not least its President Mario Draghi (*Graph*), and were further solidified by the substantial disinflation which persisted throughout the second half of 2014.

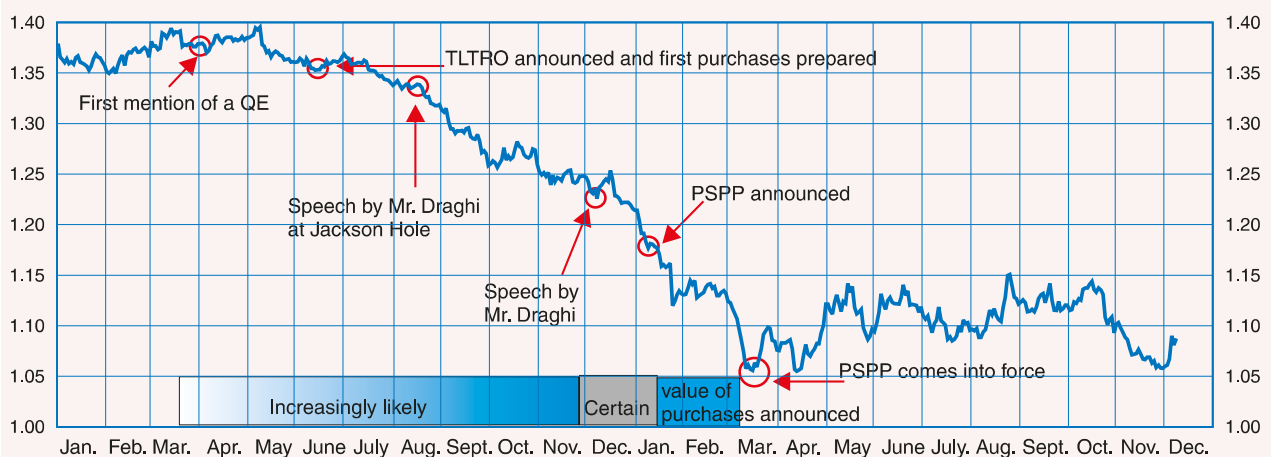
Most significantly, announcements of inflation figures for the Eurozone were followed by sharp drops in the Euro exchange rate; hence the probability of large-scale quantitative easing, as evaluated by the markets, was growing with each new fall in inflation. These expectations were thus already influencing exchange rates and sovereign yields.

At a press conference held on 4 December 2014, Mr. Draghi announced that new measures were ready to come into force in early 2015. From then on, all interviews with members of the ECB confirmed that a quantitative easing programme was being prepared for 2015. Meanwhile the depreciation of the Euro picked up pace, indicating that the markets were now certain that the ECB would be expanding its programme of securities purchases.

The announcement of the exact value of these purchases in January 2015 allowed the markets to fully integrate this information into the exchange rates, which subsequently stabilised. Paradoxically, it was at the moment when the programme finally came into force on March 2015 that the Euro exchange rate stabilised. Similarly, after an upwards correction in May 2015, sovereign bond yields in the Eurozone stopped falling after the programme was launched. In both cases the bulk of the decrease had occurred before quantitative easing actually came into force, in anticipation of its effects.

The same phenomenon was observed between mid-October and early December 2015, in anticipation of the extension of QE announced on 3 December. ■

### Chronology of QE expectations and the Euro exchange rate



Source: INSEE

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Quantitative easing thus has an effect on the interest-rate curve as a whole. For short-term rates, the programme takes over from the standard monetary policy of modifying key interest rates now that these latter rates have effectively reached rock bottom. For long-term rates, this policy serves to channel the expectations of the various agents. Moreover, the effect of these asset purchases on sovereign bond rates is all the more significant given that these assets are purchased by the ECB in massive quantities on the secondary market (between 40 and 45 billion Euros per month).

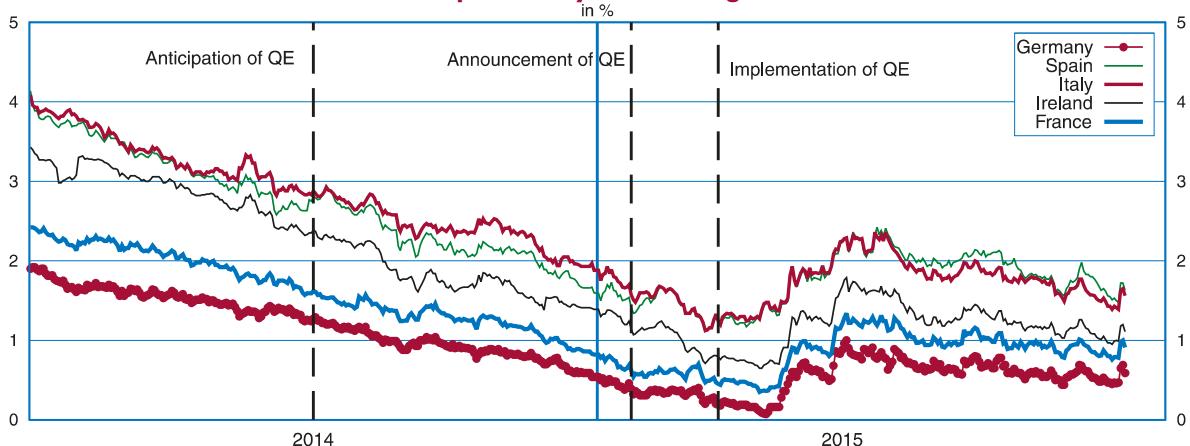
*In the Eurozone, a further objective is to reduce the fragmented nature of state borrowing*

For the core Eurozone economies such as Germany and France, the downward trend in sovereign bond yields has in all likelihood been accentuated by quantitative easing (Graph 1). Faced with the declining yields of government bonds from these core countries, investors have once again turned to the government debts of peripheral Eurozone nations: the spreads of Spain, Italy, Ireland and Portugal have decreased noticeably. This mechanism has thus served to reduce the financial fragmentation of the Eurozone.

*QE expected by the markets since 2014...*

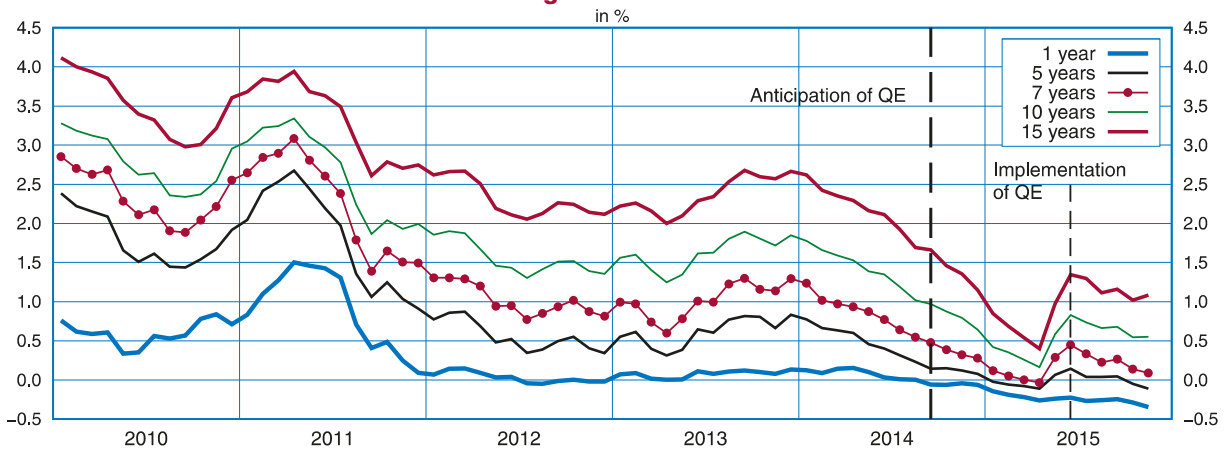
The public sector purchase programme (PSPP) came into force in March 2015. However, market players had been anticipating the introduction of a policy of this kind since summer 2014 (Box 1). This expectation may help to explain the fall in sovereign yields observed as early as 2014. Bearing in mind that the short-term interest rates were already very low, close to the ECB's key interest rate, the decline in long-term interest rates has seen the yield curve flatten: the gap between short-term and long-term interest rates is declining (Graph 2).

**1 - European ten-year sovereign rates**



Source: European Central Bank

**2 - German sovereign rates at different maturities**



Source: Macrobond

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*... with something of an overreaction in early 2015*

*All in all, the decrease observed corresponds to the initial injection of 1,100 billion Euros*

Sovereign yields continued to decline in early 2015, reaching a low point in mid-April before bouncing back. These rates have been more or less stable since May 2015. By demonstrating its determination to adhere to its inflation targets, and announcing a detailed policy programme set to run for at least 18 months, the central bank has shored up investors' confidence regarding these rates in the medium term, thus reducing term premiums.

The effect of quantitative easing on the yield curve can be quantified using a model which compares this curve to the development of key interest rates and the central bank's balance sheet (Box 2).

### Box 2 – The impact of QE on sovereign yields

The model used to estimate the effects of an increase in the central bank's balance sheet is inspired by an article by Bernanke et al. (2004). This article is part of the extensive existing literature devoted to analysing the relationship between the development of interest rates and the monetary policy instruments in play, along with other macroeconomic variables (see Ang & Piazzesi 2003, Lamé 2013, Wu & Wia 2014, Mesters et al. 2014, Monfort et al. 2015).

The aim is to assess the impact on the yield curve, i.e. the risk-free interest rates for different maturities, when the central bank uses one of its two main tools: the base interest rate and the size of its balance sheet. For the purposes of constructing this curve, German six-month and 1 to 15-year sovereign bond yields are considered as risk-free; we also consider the European OverNight Index Average (EONIA) and the 3-month Euro interbank offered rate (Euribor) for shorter maturities.

The financial literature generally focuses on three key properties of the interest curve: the level, the slope and the curvature. The level reflects the upward and downward movements of all rates in general, regardless of the maturities involved. The slope factor has a negative effect on short-term rates and a positive effect on long-term rates. A high curvature factor corresponds to a very steep curve between short and medium-term rates and only a slight curve between medium and long-term rates. While all three

factors are useful when it comes to analysing very short-term variations in the yield curve, the first two are sufficient for studies based on quarterly data. The curvature factor is therefore not included in our analysis.

Level and slope are latent factors, which is to say that they cannot be directly observed and therefore need to be estimated from available data. To keep things relatively simple, the EONIA rate is considered to provide a sufficient estimate of the level factor: the variations of this rate in the very short term are thus considered to be passed on to all interest rates. Strictly speaking, the EONIA rate is not a pure level factor because its effects are not equally felt across all rates regardless of the maturities involved. Therefore, although only one factor is used for modelling purposes, the individual rates do in fact react slightly differently.

The slope factor represents the first component in the principal components analysis (PCA) performed on the variations in the different rates in relation to EONIA. This second factor is thus, by construction, orthogonal to the level factor used in the analysis. These two reconstructed factors are more than sufficient for the purposes of reproducing the variations in the interest rates (Graph 1).

**1 - German 10-year sovereign bond yield (observed and simulated)**



Key: the simulated rate is the product of a model which uses the EONIA rate and the slope factor calculated by principal component analysis.

Sources: Macrobond, INSEE

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In order to simulate the relationship between these two factors and the various interest rates, we estimate a monthly Vector Autoregression (VAR) model for the period from January 1999 to March 2015 and apply it to a vector composed of the EONIA rates, the slope factor, the ECB's key interest rate and the size of its balance sheet. The VAR equation thus becomes:

$$Y_t = \mu + A_1 Y_{t-1} + A_2 Y_{t-2} + \Sigma \varepsilon_t$$

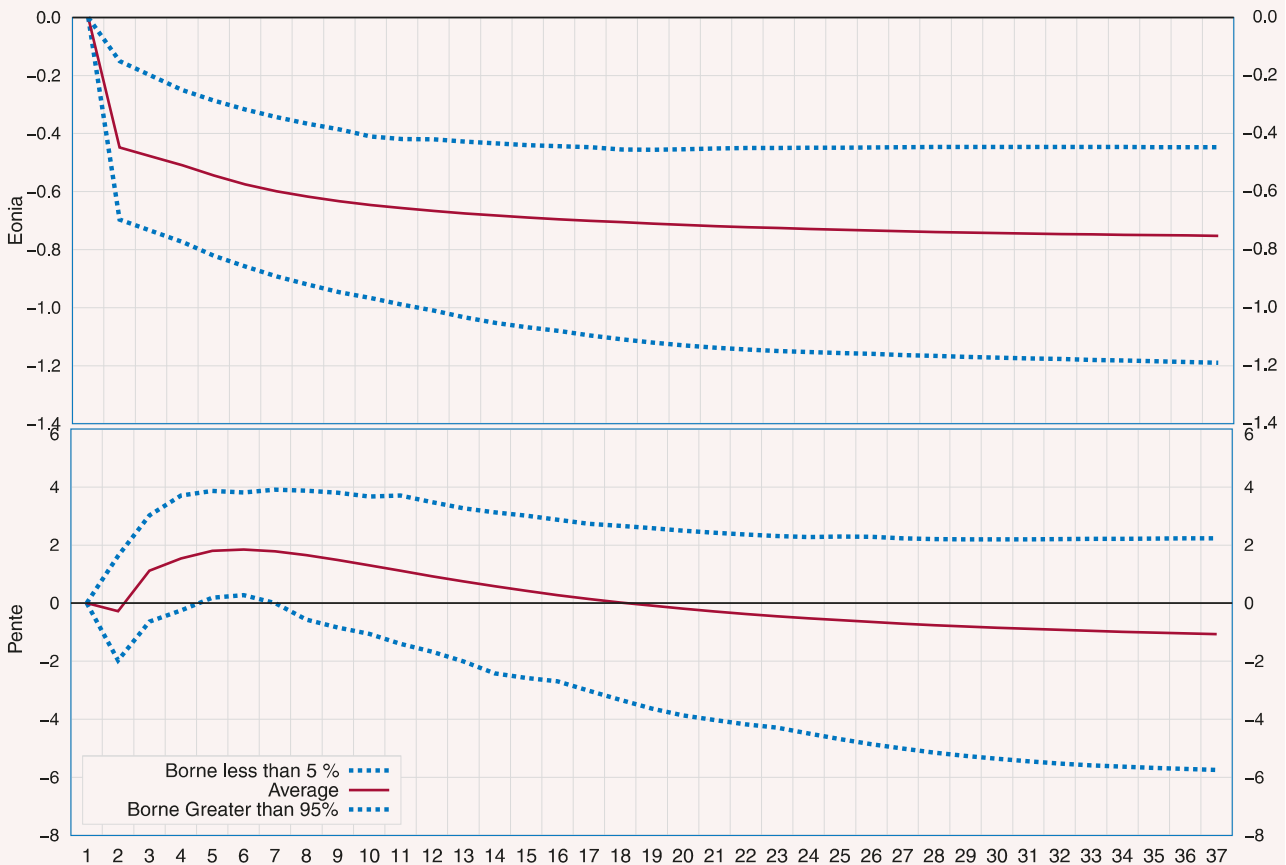
where  $Y_t$  contains the variables listed above. The matrices  $A_1$  and  $A_2$  reflect the combined influences or the components of  $Y_t$ , while  $\varepsilon_t$  represents the shocks affecting these components. The calculation is arranged so that the ECB's policy instruments are considered to be exogenous: the last two lines in the  $A_1$  and  $A_2$  matrices are held at 0. This allows us to reflect the ECB's decisions directly as shocks, in terms of the last two components of the innovation vector  $\varepsilon_t$ .

In order to assess the effects of QE, we estimate the response of the two factors which represent the rates curve to a persistent unitary shock in the ECB's balance sheet, using an accumulated impulse response function. It appears that when the balance sheet shrinks in the long term, there is no statistically significant effect on the slope (*Graph 2*). This seems to suggest that the

ECB's actions to increase its balance sheet do not, in theory, affect the level of the yield curve. As it does not incorporate the constraint posed by floor interest rates, VAR modelling does not detect any significant effect on the rate slope. Nonetheless, as short-term interest rates were already very low to begin with, they could not fall by as much as the long-term rates. We therefore observed a reduction in the rate slope.

Our model is based on the ECB increasing its balance sheet by 60 billion Euros per month for a period of 18 months starting in March 2015, i.e. the original scope of the PSPP scheme before its extension. The impulse response function allows us to determine the reaction of the EONIA rate to this programme (all other things being equal). The evolution of EONIA in relation to its March 2015 level is kinked, with two successive linear phases: over the first 19 months, EONIA sheds just under 70 basis points, then loses around 10 more basis points over the ensuing 17 months (*Graph 3*). This two-step change can be explained by the fact that the ECB's balance sheet grows over the first 18 months, before stabilising thereafter. The second phase thus corresponds to a lagged dissemination of the effects of QE.

**2 - Accumulated impulse response function of the factors affecting the yield curve to a jump in the ECB's balance sheet**



Key: a permanent increase of 1,000 billion Euros in the ECB's balance sheet leads to a statistically significant reduction in the level of the yield curve, equivalent to 75 basis points over 36 months (top graph). This shock does not appear to have a statistically significant effect on the slope (lower graph).

Source: INSEE calculations



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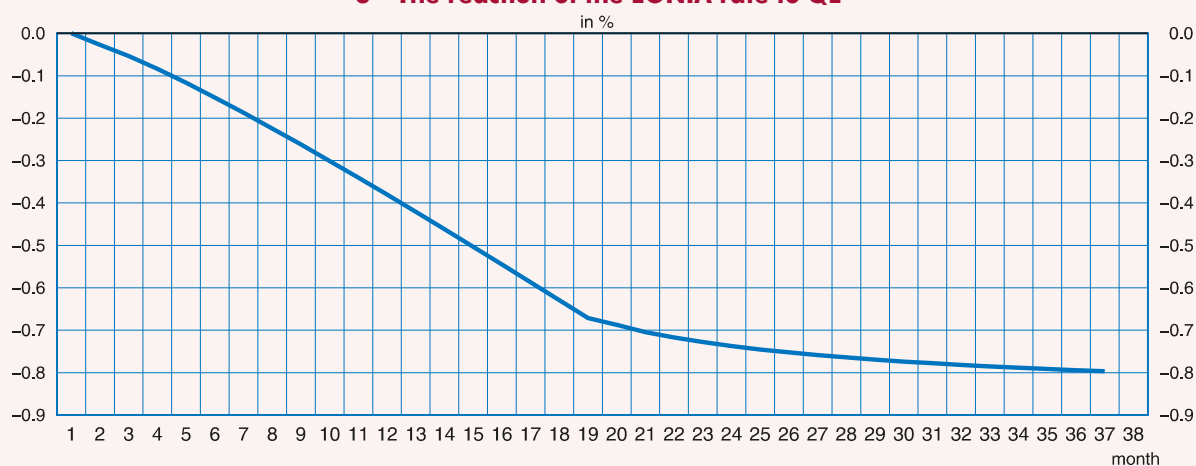
The final step is to reconstruct the variation in the yield curve based on the evolution of EONIA. EONIA acts as a level factor, which means that rates in general follow the same kinked trajectory described above. Nonetheless, as the rates do not all react in exactly the same manner to changes in EONIA, their trajectories are not strictly identical. The result is a reduction in German sovereign bond yields by around 60 basis points after 18 months, and 80 basis points in the long term.

Altavilla *et al.* calculate the effects of QE as being equivalent to 20 basis points for German yields, between 30 and 40 basis points for French yields, and between 60 and 80 basis points for Italian and Spanish yields, orders of magnitude which are comparable with, though slightly lower than, those emerging from our analysis. Nevertheless the authors use a more restrictive definition of QE, focusing exclusively on asset purchases and not on an increase in the size of the balance sheet in general. Furthermore, their methodology focuses on day-to-day variations in interest rates following ECB announcements, which probably underestimates the overall effect.

VAR modelling allows us to calculate the mechanical evolution of the yield curve to changes in monetary policy, but it neglects the effects of agents' expectations. Agents began taking actions in anticipation of QE as early as mid-2014 (*Box 1*). The trajectory of the curve obtained by VAR thus appears to be correct, but its start point needs to be placed at the moment when expectations of QE began to take hold. The variation in rates caused by QE can thus be characterised as a decrease of 80 basis points in 10-year sovereign bond yields between July 2014 and January 2015, followed by a period of stability. This makes for a better fit between the rates observed in reality and the simulations.

It is important to bear in mind that only the size of the ECB's balance sheet is taken into account here, and not the actual nature of the purchases. As QE primarily involves the purchase of government bonds, the actual impact on sovereign bond yields may outstrip the estimated effect. Nonetheless, the trajectory followed by the indexed bonds between July 2014 and January 2015 does seem to correspond to this evaluation. ■

### 3 - The reaction of the EONIA rate to QE



Source: INSEE calculations

This estimate, focused as it is on a period preceding the first effects of QE (1999 to mid-2014), does not take into account the types of asset purchased by the ECB. Nonetheless, working on the assumption that there is a sufficiently well-stocked market of interchangeable products, the fact that the ECB chooses to buy government bonds rather than other securities with equivalent levels of risk is of no consequence. This hypothesis can be justified by the fact that the ECB imposed these rules of its own volition so as not to destabilise the markets. This model suggests that the increase of 1,100 billion Euros originally expected for the ECB balance sheet will lead to a decrease of around 80 basis points in the long-term sovereign yields. This assessment of the situation appears to tally with the trajectory observed since mid-2014, taking into account the drop in inflation expected at the same time and the decrease in the ECB's key interest rate (0.1 points in September 2014): the 10-year Bund yield has been stable since May 2015 at around 0.6%, compared with 1.4% in mid-2014. Meanwhile, the inflation anticipated by the markets has fallen by around 0.1 points, when measured in terms of the break-even inflation rate for long-term German and French bonds, i.e. the difference between the nominal yield on a traditional bond and the actual yield on a bond indexed against inflation.

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*Rapid repercussion for the interest rates charged to private agents*

The fall in sovereign yields since 2014 has already had an impact on the financing conditions available to private agents in France (*Graph 3*). Private interest rates have followed a similar trajectory to that of sovereign yields, albeit with a slight time lag (*Box 3*). Moreover, the yield on private bonds has also dropped off alongside sovereign yields.

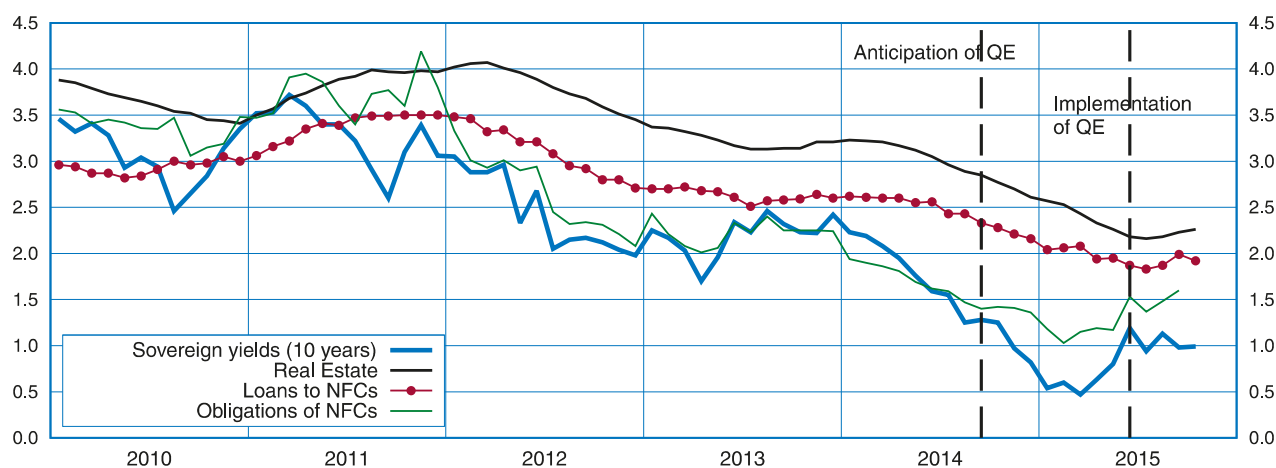
The interest rates charged to enterprises and households can be broken down into a default risk premium and a term premium. The default risk premium represents compensation for the risk that the sums loaned will not be recovered. It fluctuates in line with the prevailing economic conditions. The term premium is the compensation demanded for the fact that the loan will be repaid over a long period of time. Theoretically, this term premium is a common feature of the different markets: the reduction in the term premium applied to sovereign yields as a result of QE will be passed on to private interest rates on the same scale. The mechanism underlying this phenomenon is as follows: investors wishing to maintain a certain rate of return on their assets will turn away from government bonds, whose yield is falling, and buy up private bonds instead (see for example Bontemps-Chanel *et al.*, 2015). This increase in demand for private bonds leads to a fall in the rates of interest demanded. For bank loans, interest rates fall as a result of competition from bonds, all the more so since the financing costs of financial institutions are falling. And so, even if the risk premium associated with households or enterprises has not changed, banks may lend money to businesses and households at a lower rate of interest (*Table 1*).

**Table 1 - The decline of interest rates in France**

	Interest rate			Decrease which can be attributed to the initial round of QE
	July 2014	March 2015	September 2015	
10-year sovereign rate	1.55	0.47	0.98	-0.8
5-year sovereign rate	0.53	0.05	0.22	-0.4
1-year sovereign rate	0.03	-0.17	-0.21	-0.2
Mortgage rate	2.96	2.43	2.23	-0.8
Consumer lending rate	5.32	4.92	4.44	-0.8
Rates on loans to NFCs	2.43	2.08	1.99	-0.4

Note: the decrease which can be attributed to QE is estimated in Box 3.  
Sources: Banque de France, INSEE

### 3 - Private and public-sector interest rates in France



Sources: European Central Bank, Banque de France, Macrobond



# Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

**Quantitative easing has reduced the cost of capital for all Eurozone economies, particularly the southern nations**

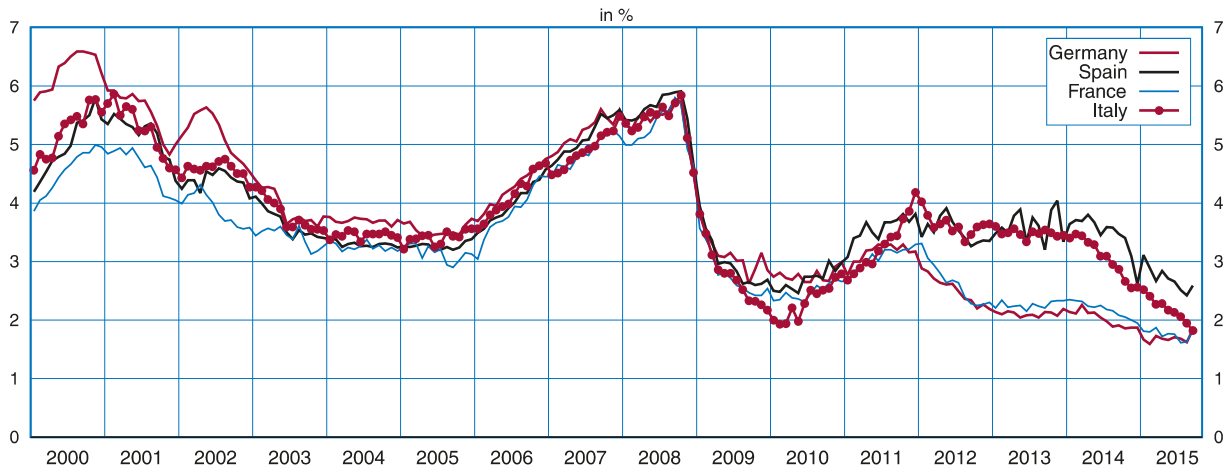
*The fall in interest rates is stimulating private investment*

The decline in private-sector interest rates has led to a fall in the cost of capital: productive investment opportunities are becoming profitable. As for property investment, purchasing power has increased mechanically and may result in an increase in property transactions. Overall, the demand for credit from private agents is improving. These effects on private demand are strongest in the southern European nations, where private interest rates have fallen more sharply than in France and Germany, another sign that the financial fragmentation of the Eurozone has been reduced (Graph 4). This increase in the demand for credit seems to have been met by the banks, as outstanding loans in the Eurozone continue to grow (Graph 5). In France, the total flow of new corporate loans with maturities of under a year increased by 15% between July 2014 and September 2015, while loans with maturities of over a year are up by 31%. Finally, the most recent survey on lending within the Eurozone (Bank Lending Survey) suggests that access to credit should ease over the coming months.

*The effects could be amplified if the banks were to reduce their excess liquidity.*

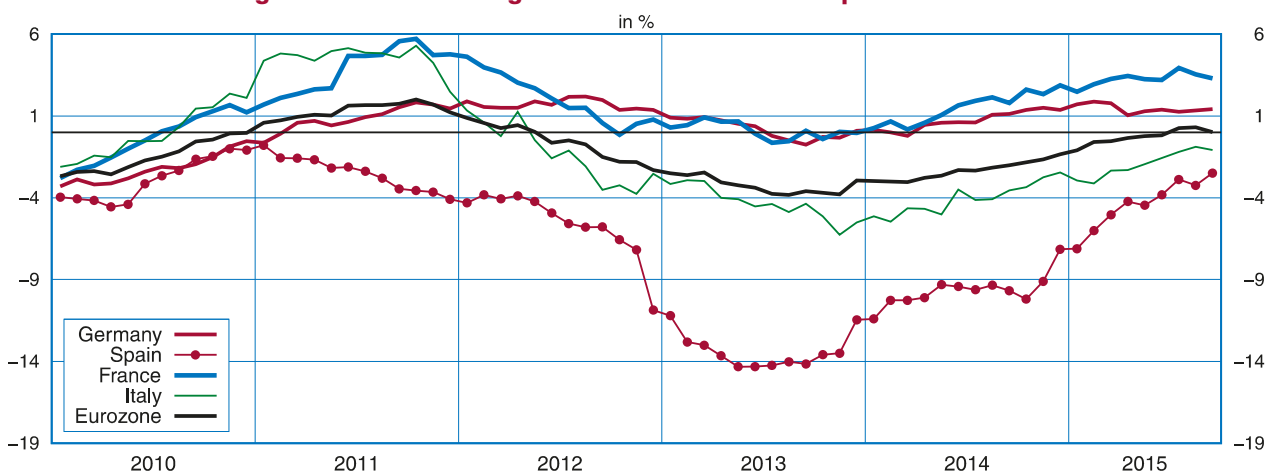
For the time being, the banks are sitting on substantial liquidity reserves provided by QE. With the ECB now applying a negative interest rate to deposits made by banks (-0.20%, cut to -0.30% on 3 December 2015), commercial banks have an incentive to convert the liquidity generated by QE into loans, and relax their lending conditions. As it stands, the banks appear to have preferred to leave the

**4 - Rates on new loans to NFCs**



Source: European Central Bank

**5 - Annual growth of outstanding loans to non-financial corporations in the Eurozone**



Source: European Central Bank

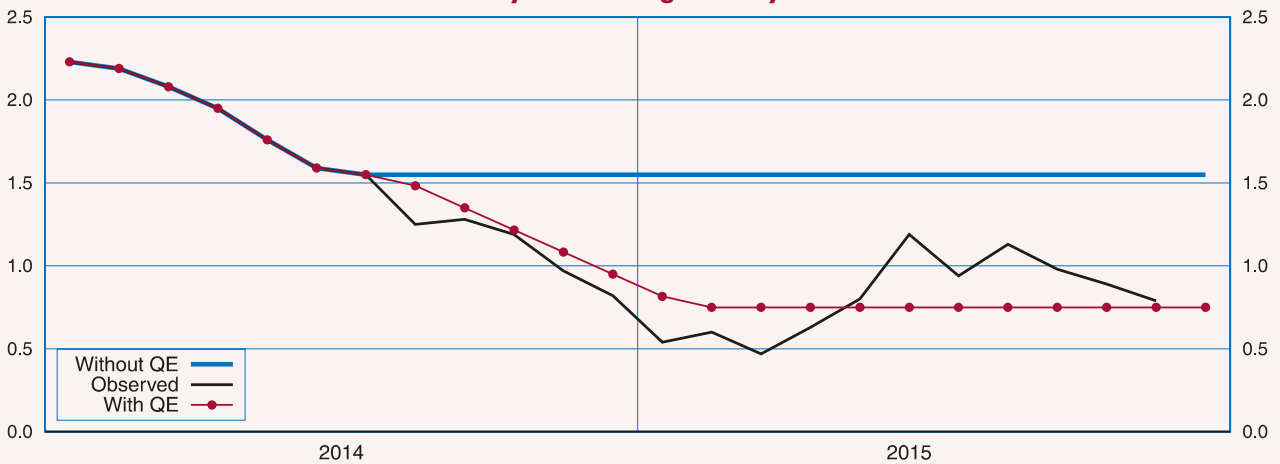
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## Box 3 - Transmission of sovereign yields to private interest rates

The transmission of the inflection in the risk-free yield curve to private interest rates is analysed through the prism of three categories of private-sector lending: new loans to non-financial corporations (NFCs), new consumer loans and new home loans issued to households. The interest rate applied to the private sector can be broken down into three components: a risk-free rate, a term premium and a default risk premium. The risk-free rate is generally considered to be equivalent to the sovereign yield rate. On top of this risk-free rate, lenders apply rates which rise as the loan maturities increase; this is the term premium. They also apply a default risk premium, which represents compensation for the risk that the sums loaned will not be recovered.

The effects of QE are characterised as a linear decrease of 80 basis points in 10-year sovereign bond yields between July 2014 and January 2015, with a decline of 40 basis points in 5-year sovereign yields. This effect is applied to a yield curve fixed from July 2014 onwards. The estimate put forward therefore does not take into account the over-compensation observed in early 2015. The pure impact of QE is calculated by comparing the trajectories 'with QE' and 'without QE' in the 'Trajectories' graph (Graph 1).

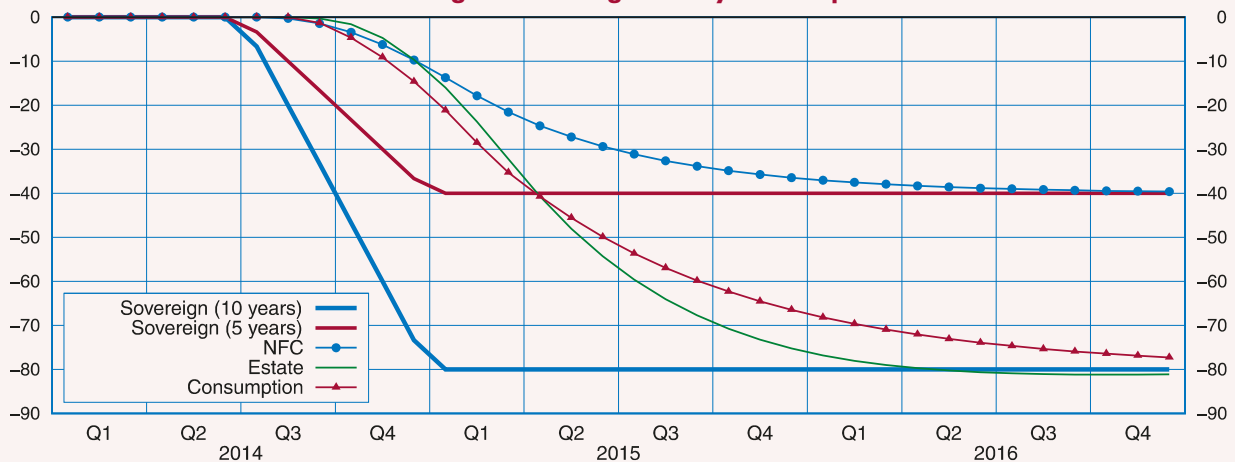
### 1 - 10-year sovereign bond yields



Sources: Banque de France, INSEE

The long-term sensitivity of the different rates to variations in the sovereign bond yields is always close to 1: private rates vary in the same manner as sovereign bond yields of equivalent maturity. By characterising the effects of QE as a fall of 80 basis points in the 10-year sovereign yields (and 40 basis points in the 5-year rates) between July 2014 and January 2015, we obtain equivalent – albeit smoothed and lagged – effects for private interest rates (see Graph) using the following models.

### 2 - The effect of the change in sovereign bond yields on private interest rates



Sources: Banque de France, INSEE



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The evolution of the interest rates charged on consumer loans, written as  $\Delta tx\_conso_t$ , depends on the French 10-year sovereign yield, written as  $fr10ans$ , on its previous values and on a dummy unit variable for June 2011 onwards which reflects the change in banking margins:

$$\Delta tx\_conso_t = 0.53 - 0.20(tx\_conso_{t-1} - fr10ans) - 0.27 \Delta tx\_conso_{t-1} - 0.21 \Delta tx\_conso_{t-2} + 0.19 \times 1_{t \geq \text{June 2011}}$$

$R^2=0.26 \quad DW=2.1$

**5 - Interest rates on consumer credit in France, observed and simulated**



Sources: Banque de France, INSEE

liquidity ultimately generated by QE with the ECB<sup>1</sup> until this summer. Indeed excess liquidity, measured as the total value of deposits made with the ECB above and beyond the minimum reserves, has increased at the same pace as the ECB's asset purchases. Since March 2015, commercial banks have thus invested around 60 billion Euros per month with the ECB (*Graph 6*). Nevertheless, this excess liquidity, which can be considered as a form of reserve credit to be allocated by the banks to the real economy, has been increasing at a slower rate since the summer.

Lending, a channel whose impact has thus far been limited, could eventually allow the influence of QE to be passed onto the real economy, particularly in the peripheral economies, as lending conditions do not appear to represent a major stumbling block in the economies at the centre of the Eurozone (see Alhenc-Gelas *et al.*, 2014).

*The fall in interest rates also stimulates income in all Eurozone countries*

To a lesser extent than that seen with investment, the fall in short-term interest rates also serves to sustain household consumption through the medium of more affordable consumer credit. Private domestic demand, in terms of consumption as well as investment, has thus increased in all countries which have seen a drop-off in interest rates. This surge in domestic demand generates additional income which is in turn passed on to economic agents. For households, the resulting surplus in activity generates new jobs and wages, which increases disposable income and, by extension, their consumption expenditure. For enterprises, this surplus leads to an increase in sales and, courtesy of an acceleration effect, an increase in investment expenditure. Finally, for general government, this surplus improves the budgetary situation by increasing revenue and reducing expenditure, particularly in the form of unemployment benefits.

<sup>1</sup> The Eurosystem has bought up securities on the secondary market from banks and insurance firms, actors who are usually net buyers, as well as from other actors. This increase in the money supply is found in the cash flow of banks either directly (if they sell securities), or via an increase in their liabilities. Without an increase in the total volume of lending, and as minimum reserves remain stable, the liquidity injected by the QE programme is considered as a surplus by the central bank.

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*This effect is amplified by foreign trade*

*Overall this effect is significant, particularly for those economies in the south of the Eurozone*

Finally, a country's activity is also affected by the fluctuations in the long and short-term interest rates experienced by its main trading partners, via foreign trade. More dynamic demand within Eurozone nations boosts imports and, as a result of the close interdependence between the countries which make up the Eurozone, also boosts world demand for their products. Exports from the Eurozone economies therefore experience an upturn, as does growth.

According to the NiGEM model (Box 4), the effect of a fall in short and long-term interest rates on growth in activity appears to be substantial for all Eurozone economies. After virtually stagnating in 2014, this effect has increased in 2015 as the drop-off in interest rates has spread: we can expect this rate cut to contribute +0.2 points to France's average growth for 2015, and +0.2 points to growth across the Eurozone (Table 2). The impact on growth in Germany should be comparable. This boost to economic activity is passed on predominantly via private investment, reacting to the drop in long-term interest rates.

Spanish and Italian 10-year sovereign yields have fallen more substantially than their French and German equivalents as a result of QE. The fall in rates is thus contributing to the dynamism of investment in Spain. All in all, the decrease in interest rates appears to have boosted economic growth in Spain by 0.3 points in 2015, compared with +0.2 points in the other major Eurozone economies.

### In France, the financial situation of non-financial agents is improving, at the expense of banks and non-residents

*An effect which theoretically works in favour of borrowers and against savers*

In theory, if banking margins remain constant, the fall in interest rates should lead to the transfer of financial resources from those agents with a financial surplus to those agents in need of financing. To put it simply, money should flow from lenders to borrowers. On the basis of the fall in interest rates which can be attributed to QE, and the financial flows observed, it is possible to estimate the gains and losses of the various agents in a static manner *ex ante*, i.e. without

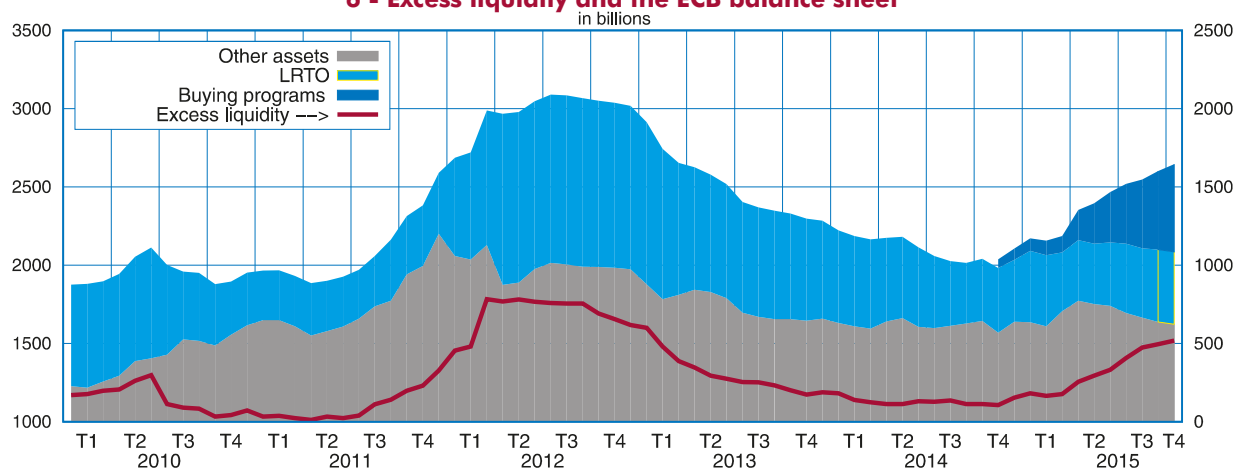
**Table 2 - Effect of a fall in short and long-term interest rates on the rate of growth of economic activity**

	points				
2015	France	Germany	Spain	Italy	Eurozone
Gross Domestic Product	0.25	0.25	0.35	0.25	0.25
direct domestic effect	0.15	0.15	0.30	0.20	0.20
indirect external effect	0.10	0.10	0.05	0.05	0.10

Note: rounded to the nearest 0.05. As a result of rounding-up, aggregates may not always represent the precise sum of all their components.

Sources: NiGEM, INSEE calculations

### 6 - Excess liquidity and the ECB balance sheet



Sources: European Central Bank, INSEE calculations

## Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

*A gain of around 2.3 billion Euros for general government in 2015, equivalent to 0.1 GDP points*

*In 2015, the savings of non-financial corporations should improve by 1.0 billion Euros thanks to QE, equivalent to 0.1% of their value added*

taking into account the fact that QE and the fall in interest rates may also have influenced the spending patterns of agents. General government and non-financial enterprises, which are in need of financing, have thus benefited from the falling interest rates since mid-2014. Household borrowers are also benefiting from this decrease in interest rates in 2015, as a result of significant renegotiation of mortgages. Considered as a whole, resident non-financial agents who are net borrowers have benefited from the fall in interest rates in 2015, at the expense of banks, investors and the rest of the world.

The fall in rates led to an immediate improvement in the financial situation of general government. Public debt stands at 2,000 billion Euros, of which 1,750 billion is in the form of negotiable debt securities with an average maturity of 7 years. Taking into account the renewal of Treasury bills (short-term debt) and fungible Treasury bonds (long-term debt), the improvement observed in the financial situation of general government which can be ascribed to the effects of QE is expected to be around 0.2 billion Euros for 2014, 2.3 billion Euros in 2015 and 4.5 billion Euros in 2016. In 2015, this should account for the vast majority of the overall reduction seen in the interest charges paid by general government. Nevertheless, other factors may have had an influence here: the downward trend of interest rates in recent years has led to a reduction in the average interest rate charged, because debt has been renewed, even though the increase of the outstanding loan capital has seen total interest charges increase.

In 2014 non-financial corporations, which are generally net borrowers,<sup>2</sup> spent around 50 billion Euros on interest on a consolidated debt of around 1,500 billion Euros, according to the national financial accounts. The fall in interest rates which can be attributed to quantitative easing should represent a saving of around 0.1 billion Euros in 2014, 1.0 billion Euros in 2015 and 1.6 billion Euros in 2016. As a yearly average, savings by non-financial corporations should be equivalent to 19.8% of value added in 2015, an increase of 2.4 points on the savings ratio seen in 2014 (17.4%): the ex ante effect of the fall in interest rates (+0.5 points, of which +0.1 points can be attributed to QE) will combine with the

<sup>2</sup> Assets in the form of debt securities held by non-financial corporations represent less than 10% of their debt securities issued.

### Box 4 - Hypotheses used to model a fall in interest rates

NiGEM is a model developed by the National Institute of Economic and Social Research (NIESR). It is a multinational model, and all of the nations it covers are included in this article individually. All of the economies included in the model are linked by trading and financial flows. NiGEM allows us to take into account the mechanisms of transmission through which a temporary decrease in interest rates affects the national economy (the direct domestic effect), but also the effect of rate changes for our major trading partners (the indirect external effect). In this model, the effect on interest rates also reflects the other financial effects of quantitative easing, such as an increase in Tobin's  $q$  ratio and an easing of lending conditions.

In order to estimate the effects of a reduction in interest rates on the growth of the four largest Eurozone economies, we construct a control scenario (with no shock). In this scenario, the variables of the model are maintained at the level (or previous trends are projected) observed before the cut in interest rates. The economic data for this model are then compared with the results obtained from an alternative scenario (following the shock caused by a cut in interest rates). This comparison allows us to quantify the effects

of a reduction in long and short-term interest rates on economic activity in each country.

More specifically, in the control scenario, short and long-term interest rates are observed up until Q1 2015, and then continue along the same trajectory up until Q4 2015. In the alternative model, short-term rates drop off gradually: by 20 basis points in Q4 2014 and 40 basis points from Q2 2015 onwards. The fall in long-term rates is also gradual. It is, however, higher in the peripheral economies (i.e. countries other than France, Germany, the Netherlands, Belgium, Austria and Finland): 10 to 95 basis points (compared with 7 to 63 basis points).

Economic policy is considered to remain unchanged over the period in question. In reality, a drop in interest rates leads to a rise in inflation which could prompt the European Central Bank to raise its base interest rate. Meanwhile, the extra economic activity allows governments to improve their budgetary situation, and could lead to an increase in public spending and/or a cut in taxes. Such effects are not taken into account by the simulations presented here. ■



## Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

*Household savers lose out as a result of QE, via their life insurance policies*

impact of the CICE tax credit and the Responsibility Pact (+1.0 point), as well as the terms of trade (+1.2 points).

The financial savings of French households stood at 4,405 billion Euros in Q2 2015; these savings are composed primarily of currency and deposits (30%), life insurance in Euro funds (31%), life insurance in units of account (6%), unlisted shares and other shareholdings (18%). The remuneration earned by savings accounts such as the Livret A has not been affected by the ECB's QE policy. Indeed the interest rate for regulated accounts such as the Livret A or the "Sustainable Development Account" was dependent upon the rate of inflation when QE was introduced. The decrease in interest rates has therefore not affected the remuneration of these accounts. Furthermore, the vast majority of current accounts available in France do not accrue interest.

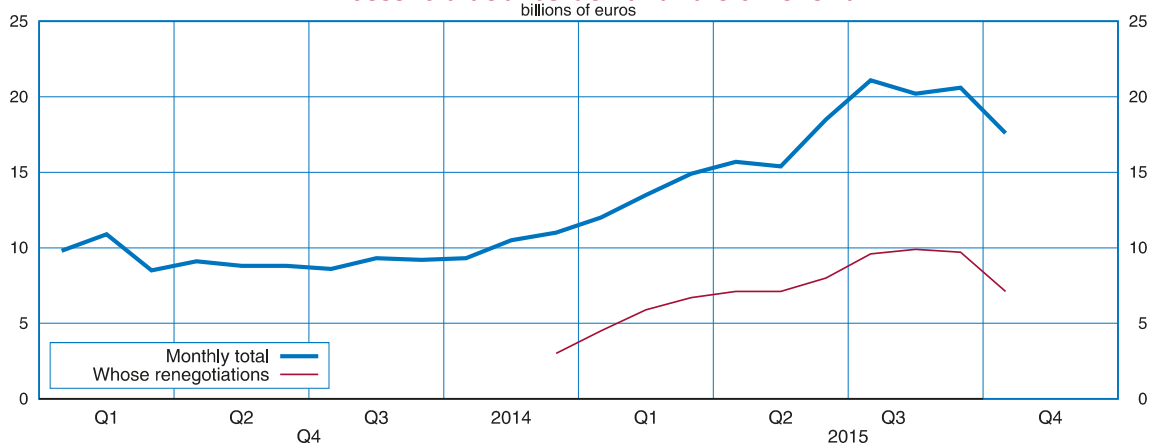
The effect of the fall in increase rates caused by QE does, however, affect the remuneration of life insurance in Euro funds. The rate offered depends on the average yield of the securities purchased as the fund evolves. Since the yields on government bonds, which account for the majority of the life insurance portfolio, have fallen sharply since 2007, the yields of Euro funds have fallen mechanically over recent years, independently of the ECB's actions. If this decrease were to be directly and fully passed on to the rates offered to insurance policyholders, only 3 basis points could be clearly attributed to the ECB's actions in 2014, rising to 10 basis points in 2015 and 2016. So for households who have invested in Euro funds, the quantitative easing introduced by the ECB looks set to reduce the remuneration received by savers by around 0.3 billion Euros in 2014, rising to 1.7 billion Euros in 2015 and 3.1 billion in 2016.

*For household borrowers, the fall in interest rates has been felt in 2015 via renegotiation of mortgages*

Meanwhile, households that are net borrowers have benefited from the effects of quantitative easing. The fall in interest rates applied to mortgages between mid-2014 and early 2015 has prompted an unprecedented wave of mortgage repurchases and renegotiations, accounting for almost half of the total distribution of credit by the banks in H1 2015 (Graph 7). The fall in interest rates has thus been passed on more rapidly than usual to the stock of property-related loans. Households stand to gain 1.0 billion Euros in 2015, and up to 2.9 billion Euros in 2016. The decrease in interest rates has also been passed on to consumer lending, with a predicted gain of 0.4 billion Euros in 2015 and 0.8 billion in 2016.

All in all, household savers have been penalised via their life insurance policies while household borrowers have benefited from more favourable lending conditions; on the whole, households look likely to have lost out in 2014 and 2015 (-0.3 billion Euros in both years). However, the balance should be in their favour by around 0.6 billion in 2016.

**7 - Household debt burden and rate of renewal**



Source: Banque de France

## Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

*With the rest of the world generally creditors, the net balance of interest paid abroad looks likely to improve*

A certain proportion of the debt securities issued by French agents, in particular public debt, is purchased by non-residents: the fall in interest rates has thus been partly reflected in an improvement of the financial circumstances of residents at the expense of non-residents. With regard to public debt securities, it appears that 2/3 of the increase in the general government balance resulting from the fall in interest rates has been achieved at the expense of the rest of the world. However, economic agents resident in France also 'lose' interest on securities purchased in other Eurozone nations, similarly affected by the decline in interest rates. According to the Banque de France, in 2014, foreign interests held 1,700 billion Euros of negotiable debt securities issued by residents (excluding financial institutions), including around 1,300 billion Euros of government debt. Meanwhile, French non-financial agents held 800 billion Euros of negotiable debt securities issued by non-financial agents in other Eurozone nations. Not including profits and losses made by the rest of the world from their involvement with French financial corporations, the fall in interest rates should lead to a loss for the rest of the world equivalent to 0.1 billion Euros in 2014, 1.1 billion in 2015 and 1.7 billion in 2016.

*Resident financial corporations are penalised, even though the value of the securities they hold has increased*

Interest rates can be broken down into 'pure' interest paid to savers and the banking margin. In the short term, financial institutions appear to have absorbed the fall in interest rates by reducing their margins. Assuming that the relative positions between resident and non-resident financial institutions were balanced (i.e. the losses of resident financial institutions on the debt securities of financial institutions from elsewhere in the Eurozone are balanced out perfectly by the gains made on their own debt securities), the impact of quantitative easing on resident financial institutions would be a decline in their balance of interest equivalent to 1.9 billion Euros in 2015. Nonetheless, this is not entirely satisfactory. On the one hand because some of the effects thus measured, in particular the gains made by households, are heavily dependent on the total amount of remuneration offered by life insurance providers in 2015, which has been estimated as part of this exercise. On the other hand because the actual value of securities held has increased as interest rates have fallen, providing a boost to the total wealth of all asset holders (Table 3).

**Table 3 - Losses and gains made from QE, by institutional sector (in billions of Euros)**

	2014	2015	2016
<b>Households</b>	<b>-0.3</b>	<b>-0.3</b>	<b>0.6</b>
of which mortgages	0.0	1.0	2.9
of which loans	0.0	0.4	0.8
of which life insurance	-0.3	-1.7	-3.1
<b>NFCs</b>	<b>0.1</b>	<b>1.0</b>	<b>1.6</b>
of which short-term loans	0.0	0.1	0.1
of which long-term loans	0.0	0.0	0.1
of which short-term debt securities	0.1	0.4	0.4
of which long-term debt securities	0.1	0.6	1.0
<b>General government</b>	<b>0.2</b>	<b>2.3</b>	<b>4.5</b>
of which short-term securities	0.1	0.4	0.4
of which long-term securities	0.1	1.6	3.5
of which loans	0.0	0.3	0.6
<b>Rest of the world excluding interbank flows</b>	<b>-0.1</b>	<b>-1.1</b>	<b>-1.7</b>
of which general government debt securities	-0.1	-1.5	-3.0
of which NFCs debt securities	-0.1	-0.8	-1.2
of which debt securities concerning Eurozone residents	0.1	1.3	2.5

Note: Based on the assumption that the relative positions between resident and non-resident financial institutions were balanced (i.e. the losses of resident financial institutions on the debt securities of financial institutions from elsewhere in the Eurozone are balanced out perfectly by the gains made on their own debt securities), these balances represent the gains and losses of resident financial institutions (commercial banks, insurers, the Banque de France, etc.).  
Source: INSEE

## Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

*The gains made by resident non-financial enterprises appear to be bolstering domestic demand*

As such, by improving lending conditions for non-financial agents, the fall in long-term interest rates has direct benefits for domestic demand, as a result of the savings made on interest payments. For businesses, the increase in the savings ratio is bolstering investment, and may be conducive to wage increases. For households, although the gains and losses generally balance each other out, the effect on consumption is not neutral. Households which are net borrowers, whose financial wealth is thus lower, have a savings ratio inferior to that of households who are net savers (Garbinti & Lamarche, 2014a), and a higher marginal propensity to consume (Garbinti & Lamarche, 2014b). Nevertheless, even if the disparity in the relative savings ratios for savers and borrowers should reach 20 points, the overall effect on private consumption would be around 0.3 billion Euros in 2015, equivalent to an increase of under 0.05 points. For general government, the savings made on the cost of servicing existing debt are not, in theory, taken into account in the draft budget bills. Therefore, in the short term these savings could lead to a reduction in the public deficit. However in the medium-term QE may serve to stimulate government spending, or else allow the government to reduce taxes.

### Exchange rates are the second major channel through which these effects are passed on

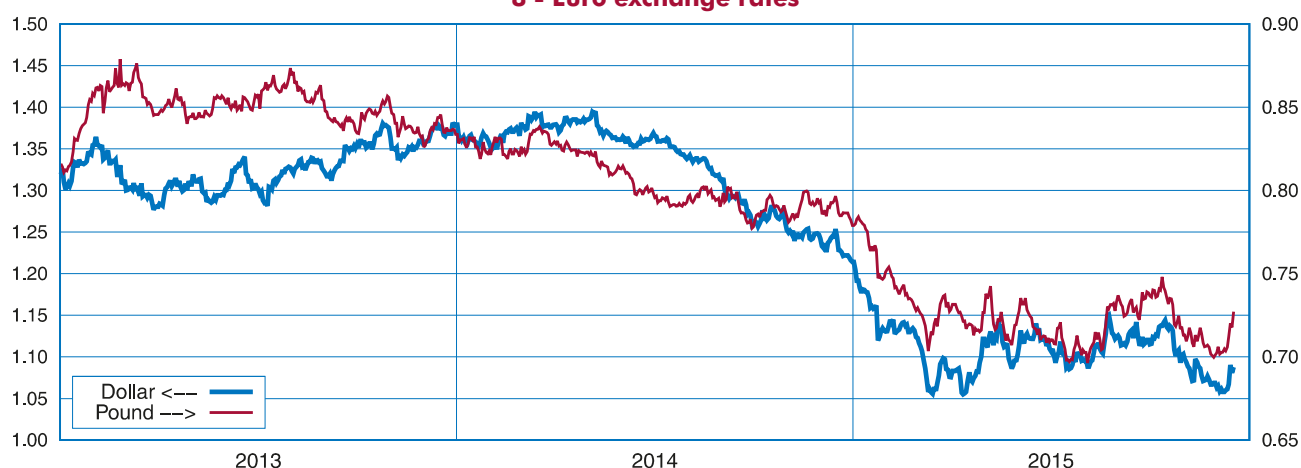
*QE has also had a depreciatory effect on the Euro*

The second channel through which the ECB's quantitative easing influences the real economy is the effect it has on the exchange rate. By injecting money and buying up European government bonds, the ECB has reduced their yield. For investors, European government bonds have now become less attractive compared to other sovereign bonds of equivalent quality, in particular American Treasury bonds and British government bonds. Adjusting their portfolios accordingly, investors sell assets in Euros to buy assets in other currencies. The foreign exchange market has thus seen a depreciation in the value of the single currency. The foreign exchange market is highly sensitive, and for this reason the depreciation of the Euro between mid-2014 and early 2015 may be largely due to expectations regarding the introduction of quantitative easing by the ECB (Graph 8).

*Prices of imported products rose immediately*

There are several potential consequences of a depreciation of the Euro. Firstly, it makes imports more expensive, generating imported inflation. As it happens, the falling prices of commodities, most notably the decline of oil prices, has offset this effect. Headline inflation including energy prices is thus stable, while core inflation (which excludes energy prices) has increased slightly since the start of 2015 (Graph 9).

8 - Euro exchange rates



Source: European Central Bank

## Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

*The French economy has won back some market share*

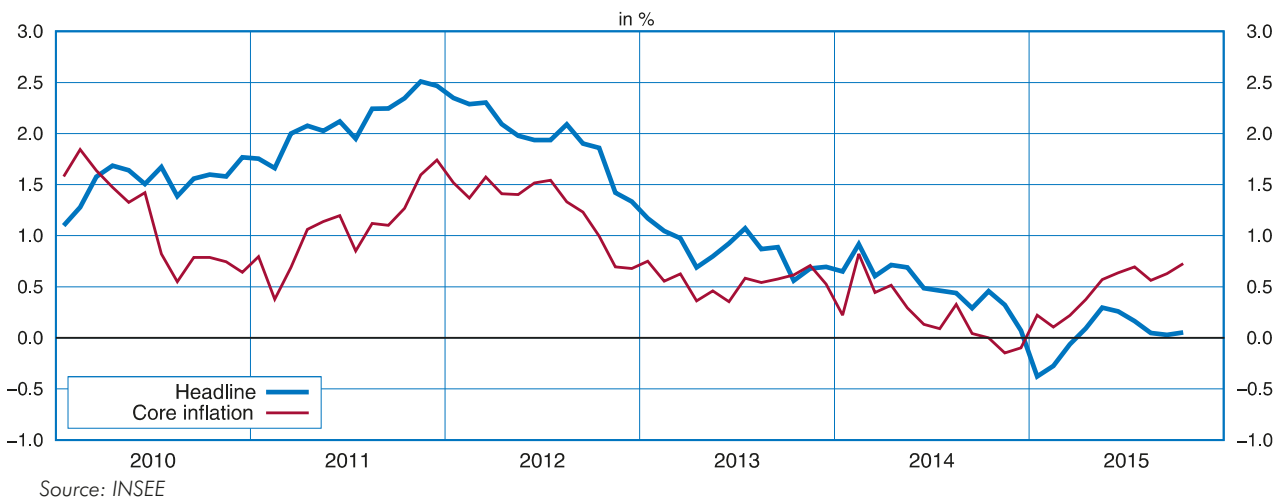
Secondly, depreciation of the Euro has a positive effect on activity: the Eurozone's price-competitiveness improves (Ducoudré & Heyer, 2014). In spite of the general sluggishness of international trade, held back by the Chinese slowdown, the Eurozone's share of the export market has increased in 2015 (Graph 10). The different tools used to predict export volumes in the *Conjoncture in France* report indicate that the effect of the depreciation of the Euro will be equivalent to +0.2 points on the annual average growth figures for 2015 (see 'The depreciation in the Euro and the fall in oil prices buoy up activity in France in early 2015', *Conjoncture in France* report, March 2015, p. 16-17).

### The asset price channel has little impact in practice

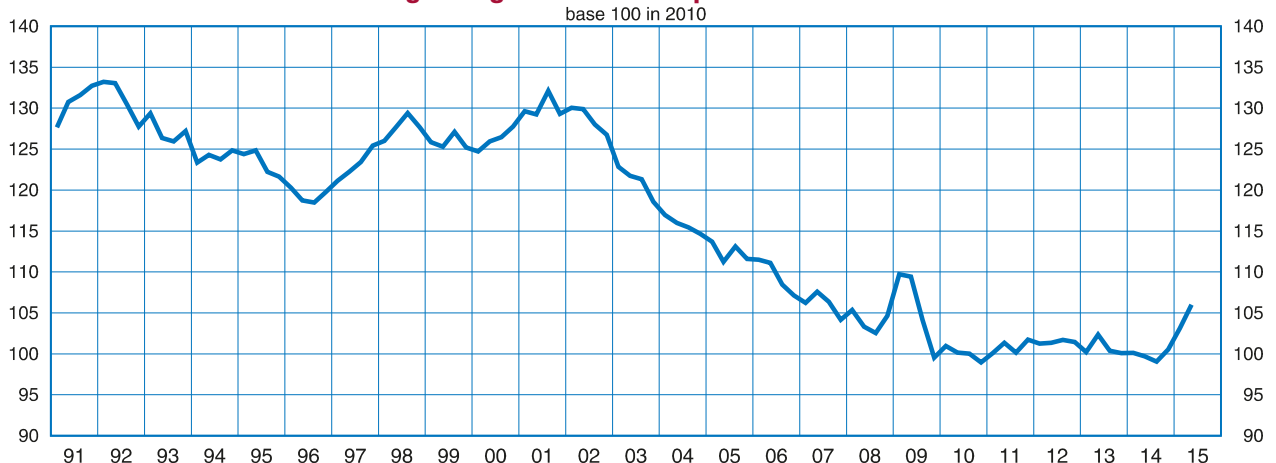
*Stock prices have risen as a result of quantitative easing*

The channels through which the effects of the ECB's non-standard monetary policy are conveyed – i.e. interest rates, lending and exchange rates – have a generally positive effect on the real economy. To this list must be added another channel, namely asset prices: by increasing the wealth of private agents, the central bank may be hoping to stimulate consumption via wealth effects, or to stimulate investment via collateral effects. However, these wealth effects have turned out to be inconsequential in the Eurozone, with regard to both household consumption (Aviat *et al.*, 2007) and corporate investment (Hauseux *et al.*, 2015).

### 9 - Headline and core inflation



### 10 - France's growing share of the export market since mid-2014



Note: France's share of the export market is calculated as a ratio of French exports to world trade, in volume.  
Sources: INSEE, Centraal Planbureau

## Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

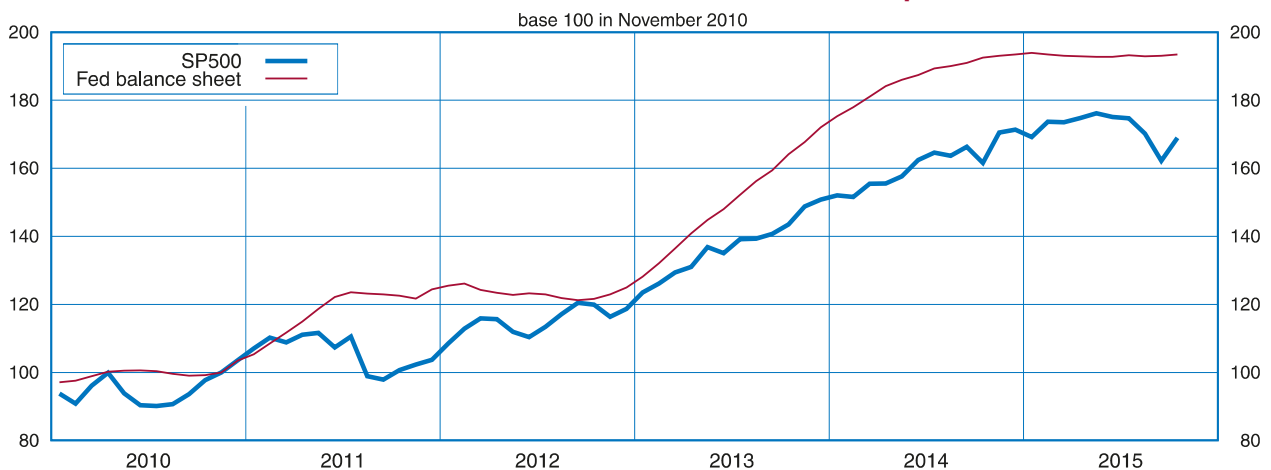
By redistributing investments, QE may also serve to promote riskier products such as equities (*Graph 11*). An increase in the market capitalization of businesses also increases their financing capacities, and may thus stimulate investment.

In reality, all other factors being equal, the German and French stock price indices rose much more rapidly than the corresponding American indices following the ECB announcement (*Graph 12*), and there is a possibility that expectations of this move could already have played a role in H2 2014. The indices then converged again after the summer, which at this stage seems to indicate that no bubble has formed.

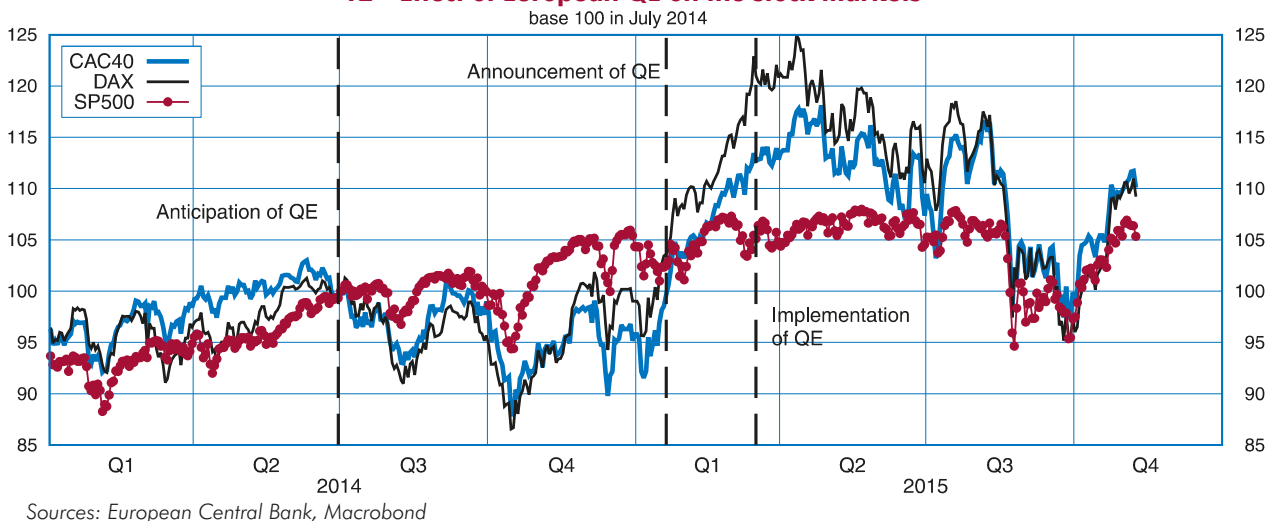
*The market for existing homes has bounced back in France*

As well as financial assets, the property market has also been affected by quantitative easing. The drop in mortgage interest rates appears to have stimulated demand on the market for existing homes: the number of transactions in this market has bounced back in 2015 (*Graph 13*). This demand is buoyed by the increase in property lending: between December 2014 and September 2015, the monthly flows of new mortgages excluding renegotiations increased sharply (+36%). Meanwhile, property prices did not rise sharply in 2014 or in 2015: while the ECB's actions may have supported property prices, this has not been the dominant phenomenon (*Graph 14*).

**11 - Link between American QE and stock market prices**



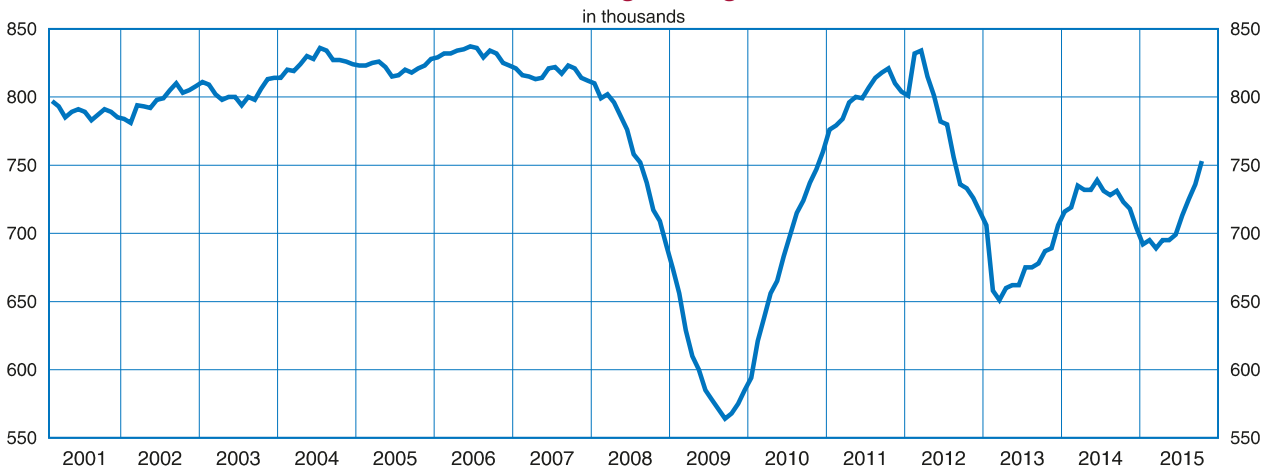
**12 - Effect of European QE on the stock markets**



## Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

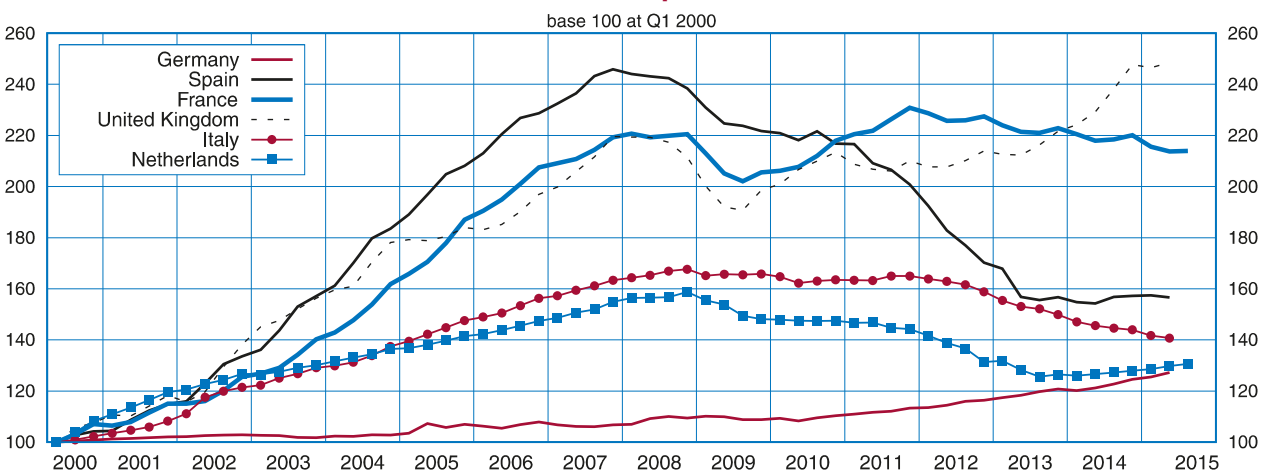
The new housing market, on the other hand, responds more slowly as a result of the unavoidable delays involved in construction and planning. In addition to the renegotiations which have lightened the budgets of household borrowers, demand has been bolstered by an increase in first-time buyers, particularly young households. ■

**13 - Number of transactions involving existing homes, total over 12 months**



Sources : CGEDD as per DGFiP (French Ministry of Finance) and notaries' databases

**14 - House prices**



Source: Bank of International Settlements



# Quantitative easing by the ECB has driven down interest rates and contributed to the Eurozone recovery

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