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Monetary policy exit scenarios in the euro area  
and in the US

# Working Paper

## No. 171

### Monetary policy exit scenarios in the euro area and in the US

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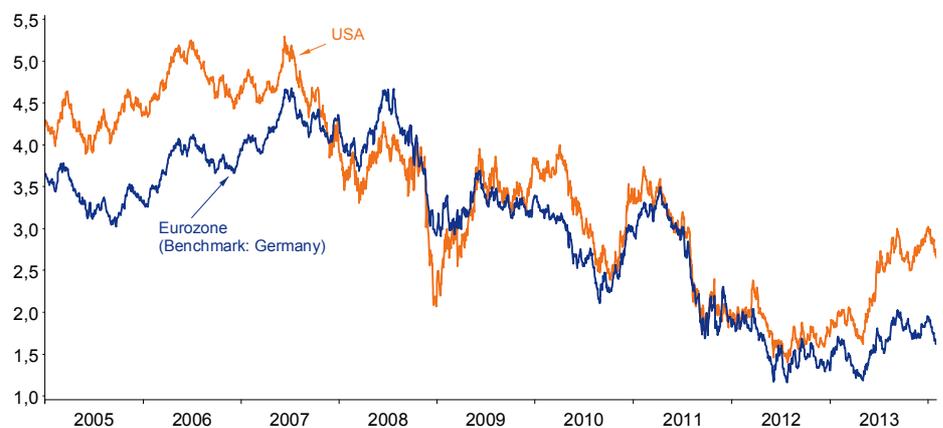
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## 1. INTRODUCTION: MONETARY POLICY DURING THE CRISIS – PAVING THE WAY FOR A SMOOTH “EXIT”

In order to combat the financial and euro debt crisis and achieve the degree of monetary expansion that is deemed appropriate, major central banks have not only nudged their key rates down to record lows touching on zero, but have also been experimenting with a number of new instruments. The Fed has turned to unconventional measures in the form of extensive asset purchases and forward guidance to push long-term interest rates down. The ECB has opened its liquidity floodgates with unlimited allocation for "normal" refinancing operations, three-year tenders and the expansion of the collateral pool, has bought a limited volume of government bonds and created a set framework for further government bond purchases.

### Capital market rates

#### 10-yr government bond yields



Source: EcoWin.

Low money and capital market rates, combined with an abundance of liquidity in the international financial system are reinforcing the economic recovery. At the same time, however, relatively safe investments are becoming less attractive. This is a welcome development to a certain extent: investors are given an incentive to shift their funds to riskier investments that hold the promise of higher returns, which generally helps to promote more favorable financing conditions. The "hunt for returns" can, however, also bring about adverse developments: if risks are concealed or understated, they can end up being concentrated in various areas of the economy and financial system unexpectedly. The low interest rate environment may prove to be a breeding ground for future financial imbalances. When deciding whether to continue with the unusually expansive monetary policy over a more prolonged period of time, it is important to weigh up the benefits and the risks.

The crisis policy pursued by the major central banks is the subject of much controversy in the public arena. On the one hand, central banks are being showered with praise for having used their role as key players to prevent the crisis from escalating even further. On the other hand, they are being confronted by critics who argue that the flood of liquidity will inevitably cause inflation – despite the fact that, five years on from the Lehman collapse, the inflation prophecies have failed to materialize to date, with global inflation rates actually on more of a downward trend at present. Specifically in the euro area, the ECB is also being accused of state financing through the back door, a tactic that critics feel also takes necessary reform pressure off the crisis-ridden countries. To keep things

in perspective, however, it is important to note that the countries in crisis have made considerable progress with their reform and adjustment efforts, even if the timelines for consolidation have been stretched due to the economic conditions.

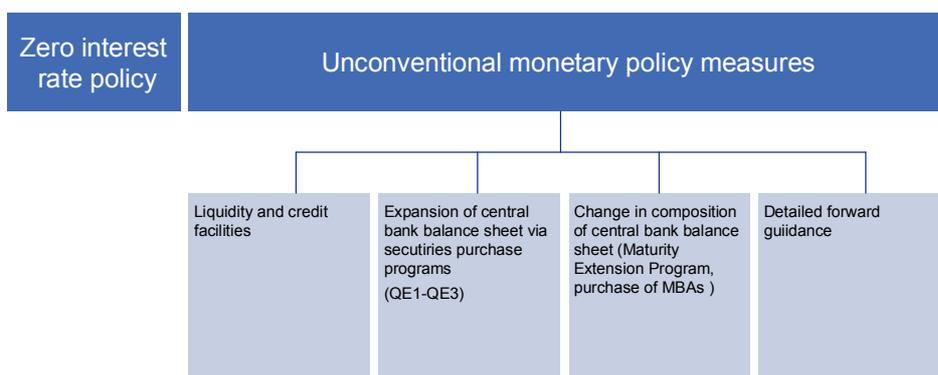
There are also justified concerns that low interest rates will, in the long run, pose a problem to savers looking to accumulate assets and that negative real interest rates will mislead investors in their investment decisions and could potentially feed financial market bubbles. Exaggerated trends on the financial markets are a key argument in favor of a preventative exit from monetary policy crisis mode. The longer the central banks wait, the more hooked the markets will become on the monetary policy medicine and the more extreme the reactions will be if the withdrawal treatment is not administered gently enough. The increase in yields seen last summer sparked by hints that the Fed would be retreating somewhat from its extremely loose monetary policy provided a taste of things to come in this respect. In this paper, we will attempt to forecast the right timing for the Fed and the ECB to nudge their key rates back up, and which of the two central banks will make a move first. Interest rate reaction functions provide some guidance here. We will also be addressing the question as to how the central banks could choose to time moves to tighten interest rates and part company with the unconventional measures that have been taken, and how the liquidity injections are likely to be scaled down.

## 2. FED

### 2.1 US monetary policy since the financial crisis of 2007/2008

The US central bank reacted to the real estate and financial crisis using a considerably broader, differentiated set of tools.

#### Monetary policy measures since the financial crisis 2007/2008

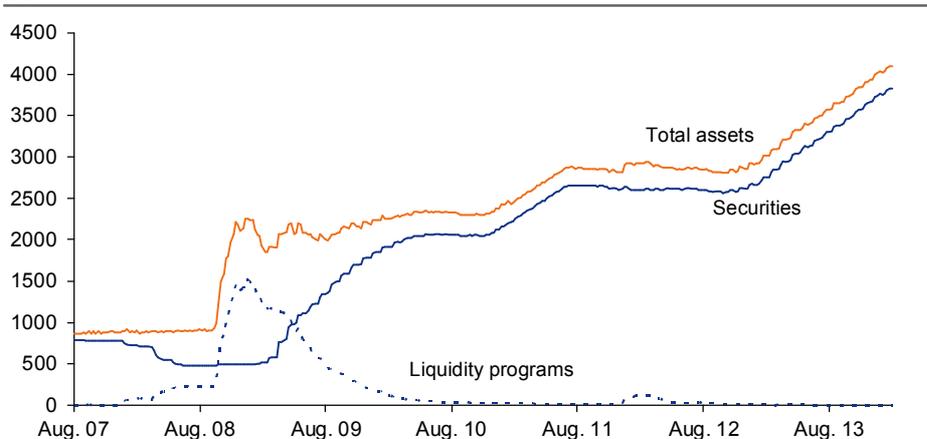


In the period between September 2007 and the end of 2008, the Fed pushed the federal funds target rate down from 5.25% to 0-0.25%, a target mark that remains in force today. The first set of measures taken by the Fed was also focused on efforts to improve the ability of the financial markets to function properly and, as a result, boost monetary policy transmission. A large number of liquidity and credit facilities were made available in order to achieve this. Many of these programs, however, such as the "Primary Dealer Credit Facility" or the "Term Securities Lending Facility" have since run their course or have actually been discontinued completely.

Since arriving at what is effectively the absolute floor for key interest rates, the Fed has also taken new approaches designed to allow it to make monetary policy more expansive in ways other than cutting key rates to virtually zero.

#### Fed balance sheet

USD bn



Source: Federal Reserve Board.

The expansion of the central bank balance sheet achieved by buying up longer-term securities is the Fed's attempt to directly narrow the gap between short and long-term interest rates. The term "quantitative easing" does not, perhaps, provide an entirely

sufficient description of the true essence of these activities, because it shifts too much attention to the expansion of surplus reserves in the banking system. Rather, the stated intention of high-volume asset purchases is more to exert downward pressure on longer-term market interest rates (government bonds, mortgage rates) in an attempt to provide incentives for investors to re-juggle their portfolios in other market segments, too, and, in doing so, create favorable overall conditions across the board to prop up the economic recovery.

The forward guidance is headed in the same direction. Effective communication is seen as a key element of effective monetary policy because economic participants tend to look ahead when deciding what action to take. Expectations regarding future developments influence the decisions that financial market participants, non-financial corporations and consumers take today. Forward guidance is aimed at allowing the public to form accurate expectations of the likely monetary policy course. In this respect, it would appear to be a particularly useful tool at the zero interest rate bound, because its impact does not depend on the ability to change the current key rate.

Model analyses<sup>1</sup> suggest that, when the zero interest rate bound is reached, it can prove a good idea for monetary policy to opt to leave key rates low for longer than would normally be the case, i.e. for a longer period of time than traditional policy rules would advise. So it could prove beneficial to use public guidance suggesting that monetary policy will remain "too loose" for some considerable time to come.

One channel via which this sort of arrangement could have an effect is evidently the long-term interest rate level. Since long-term interest rates depend on the short-term interest rates expected over a bond's lifespan, the central bank can create a lower interest rate level at the long end of the market by announcing that it will be keeping key rates low for a more prolonged period. One alternative mechanism of action would be: if short-term interest rates are kept at a lower level than a cautious central bank could normally allow for a longer period of time, then the markets would, however, ultimately expect higher inflation in the future as well. A temporary bout of higher inflation expectations would – all other conditions remaining as they are – push real interest rates down and stimulate the economy. Another channel via which this sort of arrangement could have an impact is the influence that it has on how people judge the future economic outlook. A credible commitment to keeping key interest rates at a low level for longer than usual is designed to prompt the public to expect higher economic growth and higher income levels in the future. If they anticipate that better economic times lie ahead, households and companies have less reason to save for precautionary motives. Instead, they can consume and invest more today, boosting current aggregate demand. This only works, however, if they trust the central bank to be able to prevent its policy from fueling inflation. The central bank's ability to manage the public's expectations regarding future monetary policy and economic development also depends to a decisive degree on the extent to which it sticks to this policy approach. If the public has no faith in the central bank sticking to the course of action it has announced, then its expectations fail to change and the policy is rendered ineffective.

In spite of possible concerns about this sort of temporal inconsistency, the Fed has made various attempts to commit to a particular policy course in its communications. In December 2012, it opted to use numerical thresholds for unemployment and inflation as a way of setting a course depending on economic development.

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<sup>1</sup> e.g. Reifschneider, David L. and John C. Williams; "Three Lessons for Monetary Policy in a Low Inflation Era", Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series, no. 44 (1999).

## 2.2 Current monetary policy guidance

With the rewording of the forward guidance and the completion of an additional asset purchase program (QE3), monetary policy was made more expansive again in December 2012, not least because the employment level fell well short of the high target set by law. The first major corrections, such as the move to cut down on the monthly asset purchases, came in December 2013. The main elements of the monetary policy guidance are currently (cf. Monetary Policy Release dated January 29, 2014):

- (1) Federal funds target rate of 0%-0.25%
- (2) Asset purchase program: purchase of longer-term Treasury securities and agency mortgage-backed securities in an amount of USD 65bn (reduced from a previous level of USD 85bn up to December 2013).
- (3) Forward guidance:
  - a. The FOMC expects that a highly accommodative stance of monetary policy will remain appropriate for a considerable time after the asset purchase program ends and the economic recovery strengthens.
  - b. The asset purchase program is to be maintained until the outlook for the labor market has improved substantially in a context of price stability. Reduction in the pace of the monthly purchases in measured steps depending on the data (labor market, inflation).

The current key rate level is to be maintained for at least as long as the unemployment rate remains above the 6.5% mark, projected inflation does not exceed 2.5% over the next 1 to 2 years and inflation expectations remain well anchored.

As things stand at present, the Fed feels that the zero interest rate policy will remain appropriate well past the time that the unemployment rate declines below 6.5%, especially if projected inflation continues to run below the Committee's goal.

Within this context, the asset purchases are designed primarily to boost economic momentum in the short term. On the other hand, the zero interest rate policy is intended, in combination with the forward guidance on the key rate, to maintain highly accommodative monetary policy for a prolonged period. So in this respect, the Fed has already stated the order in which it intends to normalize monetary policy.

With the threshold values for unemployment and inflation<sup>2</sup> and the wording used in (3a), the central bank is sending out clearer signals to the public (compared with the approach it took in the past of setting a date up until which it did not expect key rates to change) that it is prepared to stray from its usual reaction patterns. The Fed implicitly assumes that market participants have a good grasp of how the reaction function works in "normal times", meaning they can judge how key rates could react to changes in the economic conditions. The Chair of the Fed's Board of Governors Janet Yellen<sup>3</sup> has referred

<sup>2</sup> At the beginning of 2012, the Fed put official figures on its legally prescribed targets. Within this context, it deems an inflation rate in the price index for personal consumption expenditures of 2% to be consistent with the objective of price stability. At the same time, the Fed is committed to achieving the target of a high employment rate. It operationalizes this through the unemployment rate. At present, it considers an unemployment rate of 5.2%-5.8% to be normal in terms of central tendency.

<sup>3</sup> Yellen, Janet L.: "Challenges Confronting Monetary Policy", speech delivered at the 2013 NABE Economic Policy Conference, Washington, D.C., March 4, 2013.

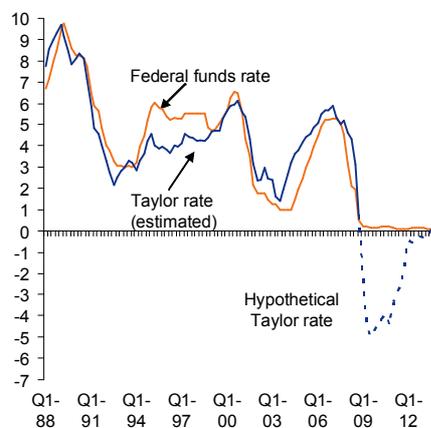
to Taylor-type reaction functions<sup>4</sup> within this context, even though the Fed does not explicitly follow this sort of rule.

### 2.3 How expansionary is monetary policy?

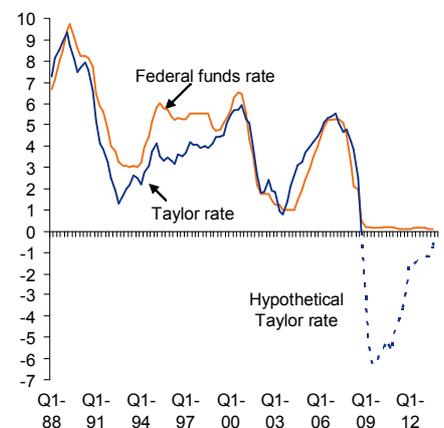
In order to categorize the current monetary policy, we have used a Taylor-type interest rate reaction function. We have estimated this on the basis of quarterly figures for the period from 1988 (Q1) to 2008 (Q4). The inflation indicator we have used is the annual rate of change in the price index for personal consumption expenditures, excluding food and energy, i.e. what is known as the "core inflation rate". Unlike in Taylor's original wording, we have estimated the key interest rate based on the unemployment gap as opposed to the production gap. The unemployment gap is the difference between the unemployment rate and the "normal" unemployment rate. The normal unemployment rate is the unemployment rate that does not fall even when the economy is running as normal. Here, we have used estimates published by the Congressional Budget Office (CBO, February 2013). Assuming a target inflation rate of 2%, we calculated reaction coefficients for the inflation/unemployment gap of a good 1.5% and -1.8% respectively, as well as a real neutral key interest rate of 2.4%. The estimating equation captures the basic pattern of key rate developments (chart below, left-hand side)

The monetary policy reaction function estimated by us is broadly similar, with the exception of the implicit estimate of the real neutral key interest rate, to the "Taylor 1999" rule, which is occasionally also used by US central bank representatives to explain monetary policy. This interest rate rule is not actually attributable to Taylor, but was proposed by other economists. Below, we will refer to this reaction function as the *modified Taylor rule*. Compared with the original Taylor rule, the coefficient for the production gap is twice as high (i.e. 1 instead of 0.5). The link between the production gap and the unemployment gap can be established with the help of Okun's law. Okun's law says that the production gap is disproportionately larger than the unemployment gap. We have used a factor of -2, producing a reaction coefficient for the unemployment gap of -2. As in the original Taylor rule, however, we have assumed a real neutral key interest rate of 2% (chart below, right-hand side).

**Federal funds rate and estimated Taylor rate**



**Federal funds rate and Taylor rate according to modified Taylor rule**



Sources: EcoWin, Congressional Budget Office, own calculations.

<sup>4</sup> For explanatory information, please refer to the Appendix.

The reaction functions "recommend" a negative key interest rate for the period from early 2009 to Q2 or Q4 2013, which, of course, is not possible. These results can be seen as a certain justification for quantitative easing, in order to make monetary policy more expansionary with the aim of stabilizing prices and the economy. In order to determine how expansionary monetary policy is, the impact of the asset purchase programs definitely has to be taken into account.

Numerous studies suggest that the asset purchase programs are responsible for pushing the yields on 10-year US government bonds down. The results of the estimate, however, are spread across a broad spectrum and there are also some differences in terms of how sustainable the impact of the unconventional measures on yield levels is. According to calculations performed by the International Monetary Fund (IMF)<sup>5</sup>, the asset purchases shaved a total of 100 basis points off yields in the period from September 2008 to March 2013. In order to achieve this outcome by cutting key rates, the key rate would have to have dropped by a further 200 to 300 basis points, assuming that key rates have an effect of 0.5/0.3 on the long-term interest rate level.

Since the spring of 2013, however, long-term interest rates have risen considerably, and are now up by more than 100 basis points on the level seen at the start of 2013. Yields started to climb after the Federal Reserve had initially indicated, in May, that it was about to slow down its asset purchases, unveiling in June a possible timeframe for the end of the measures. The latter scheduled a slowdown for later on in 2013 and an end to the program for mid-2014, subject to the proviso that the unemployment rate falls to 7% as the economy continues to gain ground.

Market reactions clearly show that it is difficult to control long-term interest rates, especially since it is tricky to identify the channels via which the unconventional measures influence them.

The marked increase in yields in the summer months was ultimately also triggered by pronounced shifts in key rate expectations (namely the expectation that a rate hike would come sooner than signaled by the Fed). This suggests that, from the market's perspective, there could be a close link between large-volume asset purchases and the forward guidance for the key interest rate. According to what is known as the "signal effect", it is not so much the direct effects that are decisive in determining the market impact of asset purchases. Rather, they help to make the communication of future intentions more credible, because the central bank takes actions to back up its words.

The decision taken in December 2013 to start scaling back the asset purchases is the Open Market Committee's way of recognizing, for one thing, the improvements that have emerged on the labor market since the program was launched. For another, the decision reflects the greater confidence the Committee has in the employment gains proving sustainable, given its expectations of accelerated economic growth. With the prospect of further adjustments (depending on the data) to the monthly asset purchases, the program could be brought to a full conclusion in November 2014 if the volume is reduced by USD 10bn at each of the future Open Market Committee meetings.

Once the asset purchase program has come to an end, the Federal Reserve could leave its policy intact for a few months, leaving the total assets unchanged. This means that it would then continue to reinvest any funds it gets back from bonds that have reached maturity. The decision to end this reinvestment policy will probably constitute the first

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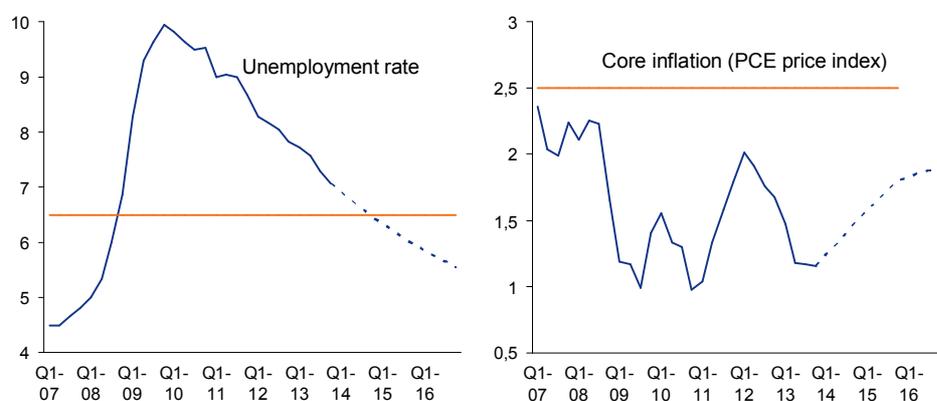
<sup>5</sup> International Monetary Fund, United States 2012 Article IV Consultation, Selected Issues, July 2013.

step in the tightening of the monetary policy reins, at least if we are to follow the exit strategy principles set out in June 2011, although these are being revised. From this point in time, the Fed's total assets would fall, albeit only very gradually, because the Fed has a relatively small volume of short-dated bonds in its portfolio, not least due to the 2012 Maturity Extension Program (sale of short-term government bonds in favor of the purchase of government bonds with longer maturities).

### 2.4 Key interest rates: "Low for longer", but for how long?

Although the Fed provides some guidance on the conditions that have to be met before the first rate hike can be implemented, it is only by also considering the macroeconomic projections and the key rate forecasts of the participants in the Open Market Committee meeting (central bank governors and presidents of the Federal Reserve banks) that we can estimate when the Fed could switch over to tighter monetary policy.

#### Unemployment rate and core inflation according to FOMC projections\*



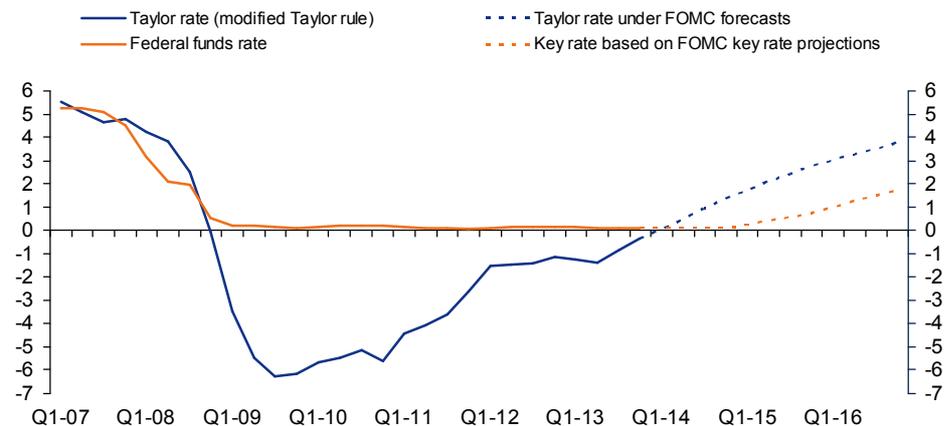
\* Based on middle of central trend of projections of participants at the FOMC meeting on 17/18 December 2013. Linear interpolation.

Sources: EcoWin, Federal Reserve, own calculations

The Fed's macroeconomic projections from December 2013 suggest that the unemployment rate will have slipped to below 6.5% by the end of the 2014, more or less reaching a normal level of 5.3%-5.8% by the end of the forecast horizon (Q4 2016). At the same time, the exceptionally low core inflation rate at present is considered to be a temporary feature that will move back towards its target of 2% in the forecast period.

Under these conditions, the zero line would be surpassed again in Q2 2014 based on the modified Taylor rule. With its forward guidance and the projections of the FOMC meeting participants (central bank governors and presidents of the Federal Reserve banks) regarding the key rate at the end of a given year, the Fed is, however, signaling that it could wait until Q2 or Q3 2015 to lift key rates up a notch for the first time. This is because, first of all, the Fed's updated forward guidance (updated in December) points out that, even when the unemployment rate touches the 6.5% mark, this will not result in any immediate increase in key rates. Second, the median key rate forecast for the end of 2015 comes in at 0.75%, suggesting that the first interest rate step will come in the latter part of 2015. By the end of 2016, the federal funds rate could have risen to 1.75%. In the graphic, we have assumed a linear increase to this level.

### Projection key rate and Taylor rate (modified Taylor rule)



Sources: EcoWin, Federal Reserve, own calculations.

This means that the Fed is only hinting at a very gradual normalization in the key rate. Even in 2016, the key rate would remain well down on the "neutral" level of around 4%, in spite of virtually full employment and price stability at the end of 2016. The Fed explains this marked deviation by referring to the lower level of the balanced (real) interest rate, i.e. the short-term interest rate, which is consistent with the level of economic growth/full employment that corresponds to the economy's potential and with a stable inflation rate. It lists a number of factors in this context, such as the slow recovery on the residential property market, the ongoing budgetary consolidation and the knock-on effects of the financial crisis, which could continue to keep a handbrake on the economic recovery for some time to come. At the same time, however, it admits to substantial uncertainty surrounding these longer-term projections.

## 2.5 Forward guidance with discretionary leeway

The forward guidance regarding the key rate that has been used since December 2012 is marred by the difficulty in striking a balance between a desire to paint a clear picture of future monetary policy on the one hand, and the wish to keep a degree of discretionary leeway on the other. As far as the key rate guidance is concerned, the latter is expressed in the wording "at least as long as". So the numerical values for inflation and unemployment are, in fact, no more than threshold values. The fact that one of the parameters reaches the threshold value does not necessarily mean that the federal funds rate will rise.

Central bank representatives<sup>6</sup> had already pointed out, in the course of last year, that the Open Market Committee could put off any key rate hikes if

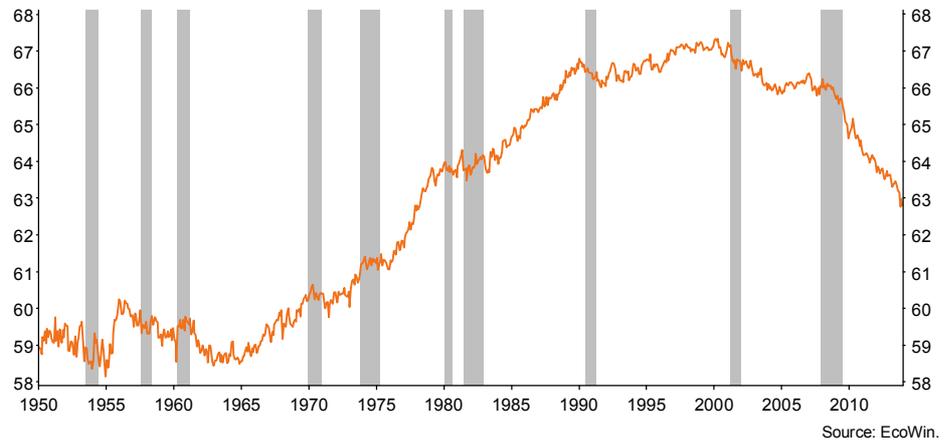
- inflation were to remain well below the 2% target mark
- or the Open Market Committee were to take the view that the unemployment rate confirms the underutilization of the labor factor. This could, for example, be the case if the drop in the unemployment rate were to reflect a lower labor force participation rate for cyclical reasons.

This means that the quality of the drop in the unemployment rate is evidently another important factor and the central bank is ultimately reserving the right to take a broad range of indicators into account when making a decision on whether or not to lift key rates.

<sup>6</sup> See Yellen, Janet L.; "Challenges Confronting Monetary Policy", op. cit.- Bernanke, Ben S., "Statement before the Committee on Financial Services, U.S. House of Representatives", July 17, 2013.

Looking at the labor force participation rate, which has fallen by no less than 3 percentage points since the end of 2007 (when the recession started), it proves difficult to pinpoint the relative importance of structural and cyclical factors in this development. Consequently, there is some uncertainty regarding the extent and timing of a cyclical recovery in labor force participation.

**Labor force participation rate (%)**



With the recent update to its forward guidance for key rates, the Fed is now explicitly wording its statement on the monetary policy resolutions to take account of the fact that, even after the unemployment rate has dropped to 6.5%, the labor factor could still remain substantially underutilized. The change in what the Fed is communicating is, however, of a qualitative nature. It does not bind the Fed in the same way that a reduction in the threshold value for the unemployment rate or the introduction of a lower threshold for inflation – options that had been the subject of speculation in advance of the December FOMC meeting – would.

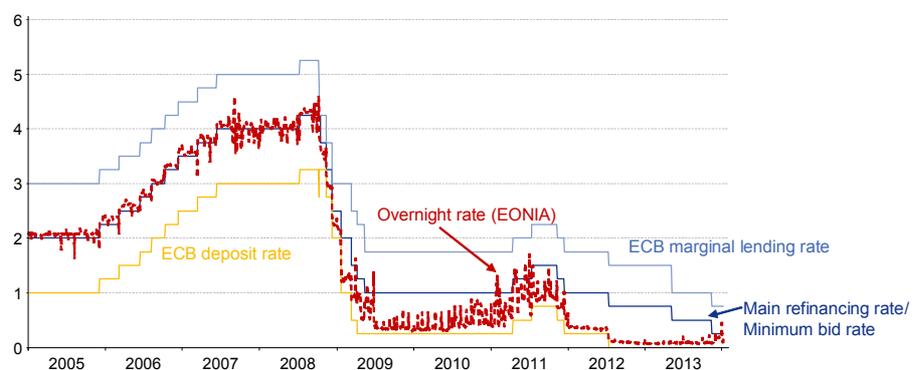
### 3. ECB

#### 3.1. Characteristics of the ECB's crisis policy

When describing its reaction to the financial crisis, the ECB makes a distinction between four phases<sup>7</sup>: 1.) the financial market turbulence (August 2007 – September 2008), 2.) the exacerbation of the financial crisis (September 2008 – December 2009), 3.) the temporary improvement in financial market conditions (December 2009 – May 2010), 4.) the sovereign debt crisis (from May 2010 onwards). Whereas during phase 1, the ECB was still making additional liquidity available within its "normal operational framework", it took an unusual step in phase 2 by temporarily suspending the "separation principle"<sup>8</sup>.

The separation principle means that, usually, monetary policy resolutions (key rate decisions) are kept strictly separate from the implementation of these resolutions in the form of monetary policy transactions (in particular the structuring of the refinancing tenders) which do not perform any signal function of their own in respect of the monetary policy course. The reason behind this is that the separation helps to establish a close, predictable relationship between key rates and money market rates.<sup>9</sup> As the charts below show, the interest rates for the ECB's deposit facility and marginal lending facility usually form a corridor for short-term money market rates. Up until 2008, the overnight rates (EONIA) were close to the key interest rate and the gap between the three-month money rate and the EONIA swap rate was very narrow until the outbreak of the turbulence on the financial market. Then, mutual distrust between players on the interbank market pushed the three-month rates up, and widened the gap separating them from the corresponding overnight swap rate (which is largely independent of liquidity or credit risks), bringing them to a level that was no longer consistent with the monetary policy course the ECB actually wanted to pursue. The ECB therefore deemed the first link in the chain that transmits its monetary policy to the economy to be broken and reacted by taking unusual measures. This then saw the main refinancing operations rate lose its function as the key rate, something the ECB was prepared to accept on a temporary basis. Instead, the ECB's deposit rate is now playing a more significant role in the positioning of the EONIA and other very short-term money market rates than it did before the crisis.<sup>10</sup>

#### EMU: Key rates and money market rates



Source: EcoWin.

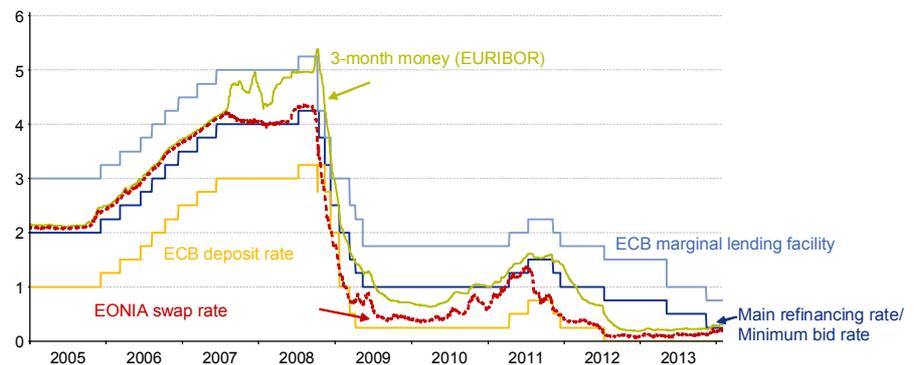
<sup>7</sup> ECB, monthly report for October 2010, p. 64.

<sup>8</sup> ECB, monthly report for January 2010, p. 69; ECB, monthly report for October 2010, p. 70.

<sup>9</sup> ECB, monthly report for October 2010, p. 65.

<sup>10</sup> ECB, monthly report for January 2010, p. 74.

## EMU: Key rates and money market rates



Source: EcoWin.

Specifically, the softening of the separation principle came in the guise of the following "enhanced credit support measures" that were resolved by the Governing Council from October 2008 onwards in addition to moves to cut key rates, as the latter were not deemed to be effective in isolation:

- All refinancing operations as fixed rate tenders with full allotment (i.e. unlimited liquidity for banks at a fixed interest rate)
- Extending the term of longer-term refinancing operations (to a maximum of 1 year, resolved in May 2009)
- Adding to the list of eligible assets (unlimited liquidity can only be used with a correspondingly large collateral framework)
- Provision of liquidity in foreign currencies (particularly in US dollars)
- Direct purchases on the market for covered bonds in the amount of EUR 60bn (announced in May 2009, limited until June 2010).<sup>11</sup>

Its approach, which was aimed at banks, was the ECB's way of reflecting the key importance of bank loans in the euro area when it comes to financing the real economy (which is much more pronounced than in the US). Issues of covered bonds, for example, are also a key source of refinancing for banks.<sup>12</sup>

Since the situation on the financial markets eased somewhat in the course of 2009, the ECB started to withdraw slightly from its role as an intermediary in December 2009 (termination of the one-year tender and the additional longer-term refinancing operations with a three-month maturity).<sup>13</sup> But as the euro debt crisis started to rear its head in May 2010, the ECB saw itself confronted with a new central challenge: an unusual trend was emerging towards more heterogeneous financing conditions, with the eurozone financial markets starting to look increasingly fragmented. The ECB felt the need to act in order to ensure that its key rates were passed on to the economy in a homogenous manner and to combat the risk of infectious trends emanating from the crisis-ridden countries.<sup>14</sup>

<sup>11</sup> ECB, Final monthly report on the Eurosystem's covered bond purchase programme, July 2010; ECB, Monthly report for July 2011, p. 70.

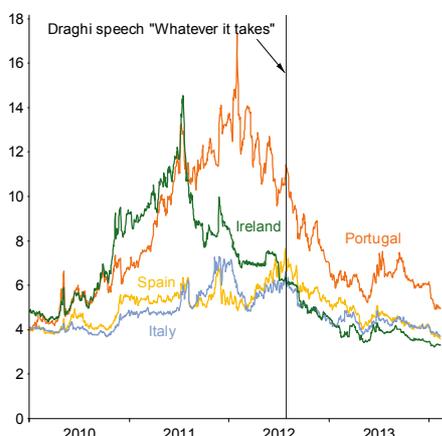
<sup>12</sup> ECB, monthly report for January 2010, p. 72/73; ECB, monthly report for October 2010, p. 70/71.

<sup>13</sup> ECB, monthly report for July 2011, graphic, p. 61.

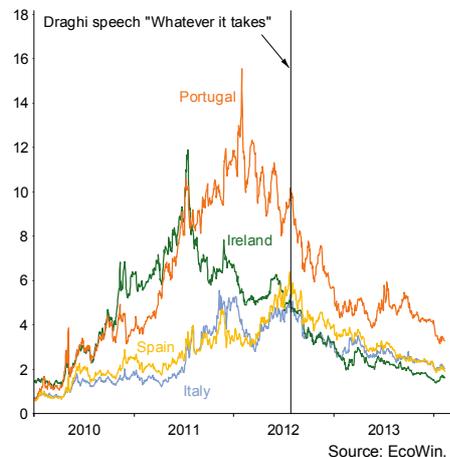
<sup>14</sup> ECB, monthly report for August 2012, p. 67.

### Unusual heterogeneity / Eurozone fragmentation

**Yields on 10yr European government bonds, percent**

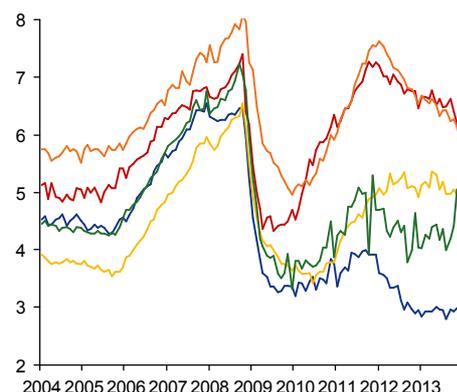


**Spread over 10yr German benchmark, percentage points**

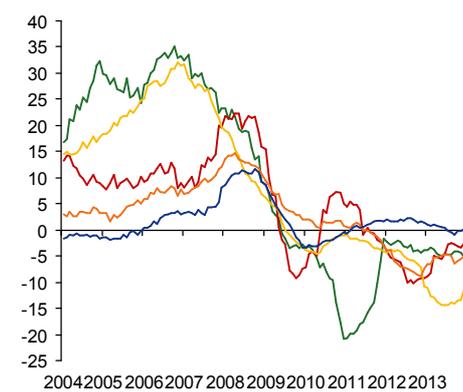


Source: EcoWin.

**Rates on new business with non-fin. companies  
Loans up to EUR 1m, variable or with  
initial fixed rate up to 1 year**



**Corporate lending, % change on year earlier**



— Germany — Spain — Greece — Ireland — Portugal

Source: ECB.

The Security Markets Programme (SMP) was launched in May 2010.<sup>15</sup> According to the ECB, this move was aimed at resolving market disruption and re-establishing an appropriate monetary policy transmission mechanism. Under the program, it was possible to buy up government and private bonds on the secondary market (mopping up the liquidity provided by the ECB as a result of the interventions again). Government bonds are a key element of the transmission process, particularly because they serve as a reference for the interest rates for bank and corporate bonds and as collateral in refinancing operations. If the bank refinancing conditions deteriorate, this can have an adverse impact on their lending activities.<sup>16</sup> The ECB wanted to prevent a credit crunch in the affected EMU countries.

As of March 2011, no more purchases were made as part of the SMP to begin with. This was followed by a fairly quiet period in which the ECB lifted its key rate from 1% to 1.5% (by 25 basis points in both April and July 2011). During this period, the ECB explained that its decisions regarding special measures and its key rate changes were not linked.<sup>17</sup>

<sup>15</sup> ECB, monthly report for May 2010, p. 8/9.

<sup>16</sup> ECB, monthly report for September 2011, p. 58/59.

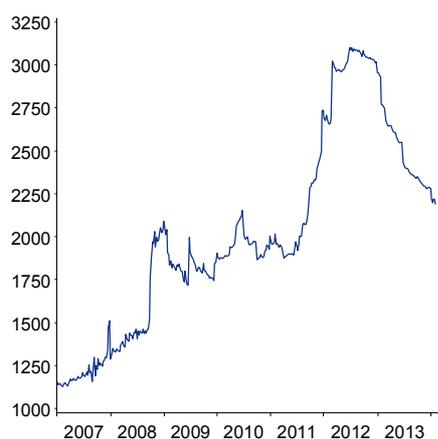
<sup>17</sup> ECB, monthly report for July 2011, p. 59, 73.

Then, however, another period of turbulence emerged on the financial markets, promoting the ECB to announce, in early August 2011, that it would be actively continuing with the SMP. The last bond purchases were made in February 2012. When the SMP ended in September 2012, the ECB had purchased total government bonds worth just shy of EUR 220bn (Greece EUR 33.9bn, Ireland EUR 14.2bn, Italy EUR 102.8bn, Portugal EUR 22.8bn, Spain EUR 44.3bn).<sup>18</sup>

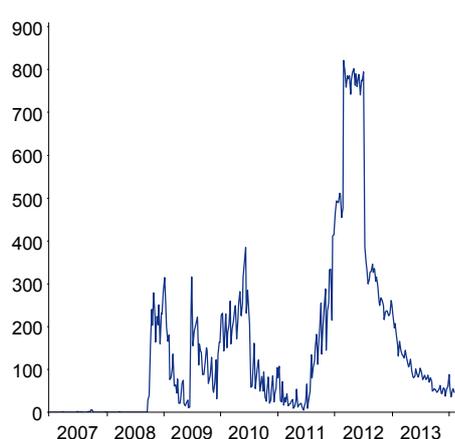
With steps to ease monetary policy in November and December 2011, the ECB went back on its previous key rate increases due to the critical situation on the EMU economy and the ongoing uncertainty on the financial markets. At the same time, it stepped up its unconventional measures in order to boost bank liquidity:

- First-time offer of two three-year refinancing operations for banks (with full allotment and the option of early repayment after one year)
- Halving of the minimum reserve ratio from 2% to 1% (freeing up collateral with the aim of promoting activity on the money market)
- Greater collateral availability a) by reducing the ratings threshold for certain ABS b) by allowing the national central banks to accept performing credit claims (bank loans) as collateral on their own responsibility.<sup>19</sup>

#### Central bank balance sheet Eurosystem Total assets, EUR bn



#### Deposit facility, EUR bn



Source: EcoWin.

The three-year tenders ("Big Bertha") were implemented in December 2011 and February 2012, increasing the ECB's total assets considerably. The liquidity splurge amounted to a combined total of a good EUR 1 trillion on both dates, with the net injection coming in at around half of this amount.<sup>20</sup> Some of the banks parked the funds with the central bank again, which is evident from the increased use of the deposit facility. Some of them also used the liquidity to buy government bonds, allowing the three-year refinancing operations to bolster the government bond markets.<sup>21</sup> When the interest on the deposit facility fell to zero as the key rate was whittled down from 1% to 0.75% in early July 2012, less use was made of the facility, with banks putting more of their funds into current accounts at the central bank instead.

In the midst of the ongoing poor EMU economic development and the never-ending debate on possible EMU exits, or even the disintegration of monetary union, Draghi's key

<sup>18</sup> ECB, press release dated February 21, 2013.

<sup>19</sup> ECB, monthly report for December 2011, p. 8-10.

<sup>20</sup> ECB, monthly report for March 2012, p. 43.

<sup>21</sup> ECB, monthly report for August 2012, p. 76.

speech made at the end of July 2012 ("The ECB will do everything in its power to save the euro") signaled the start of a phase of radical market stabilization. The introductory statement to the ECB's early August press conference then stated: "Risk premia that are related to fears of the reversibility of the euro are unacceptable, and they need to be addressed in a fundamental manner. The euro is irreversible." At the same time, the ECB announced a new program for buying government bonds on the secondary markets (Outright Monetary Transactions, OMTs) to resolve the severe disarray on the government bond markets and to prevent destructive scenarios, the conditions of which it set out in greater detail in early September 2012.<sup>22</sup>

The new program is a different kettle of fish to the one it replaces: the fact that there could well be no limits to the ECB's interventions is a new feature designed to put the financial markets off any thoughts of truly excessive speculation. What is more, more transparency surrounding intervention announcements – exact volume per country – is likely to make these interventions more efficient. Even without specifying upper interest rate thresholds, it should be possible to draw conclusions as to corresponding points of intervention. Incentives for sound budget management remain intact. This is ensured, first of all, by the fact that the purchase program only includes shorter maturities (in particular 1-3 years). What is more important, however, is the fact that the relevant country in crisis has to submit an aid application, meaning that it is subject to checks (strict conditionality). No outright monetary transactions have been executed to date. All in all, the ECB has lived up to its role as the "lender of last resort" for banks in full, but has not assumed the function of the "lender of last resort" for EMU states by way of unlimited bond purchases.

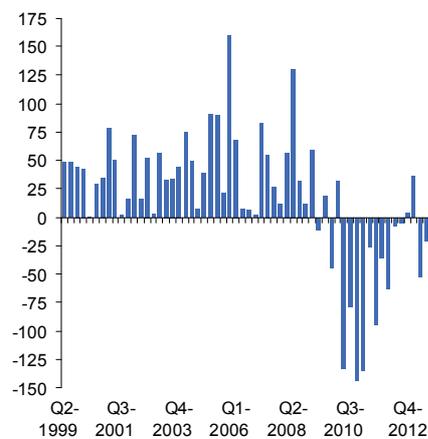
### 3.2. 2013: Crisis eases and economic hopes emerge as the ECB sticks to its easing bias

Just as the SMP announcement and the Draghi speech were starting to take effect, the adjustment progress made in the EMU countries at the center of the crisis in terms of competitiveness were becoming increasingly evident and policymakers managed to put conflicts of interest aside and agree on key elements of the European Stability Mechanism (a more stringent form of the Stability and Growth Pact, new procedures to be followed in cases of macroeconomic imbalances and key steps towards a banking union). As a result, increasing signs started to emerge on the financial markets, starting in the second half of 2012, that the euro debt crisis was on the mend: declining yield spreads for EMU problem countries (cf. graphic above), increasing cross-border activity, gradual drop in Target 2 balances.

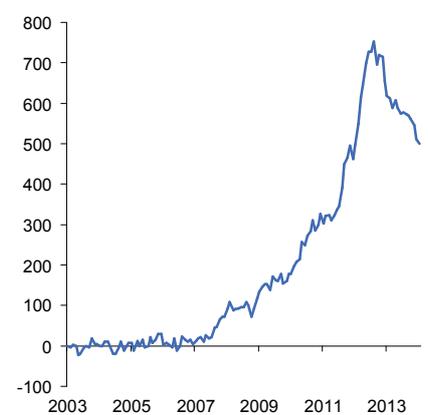
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<sup>22</sup> ECB, monthly report for September 2012, p. 7-12.

Change in outstanding net cross-border claims of eurozone banks (EUR bn, q-o-q)



Net claims of Bundesbank within Eurosystem (TARGET2), EUR bn



Source: Deutsche Bundesbank.

A marked reduction in the excess liquidity in the euro area and the ECB's total assets was prompted by the launch of the early repayment option for the three-year tenders as of January 30/February 27, 2013. While this can be interpreted as an initial step out of crisis mode, it is not an active exit move on the part of the ECB. Excess liquidity is defined as the amount of central bank balances for which there is demand among banks stretching beyond the demand defined by the minimum reserve requirements and autonomous factors. The ECB predicted that short-term money market rates would remain slightly ahead of the rate for the deposit facility for as long as excess liquidity exceeded a threshold value of EUR 100-200bn.<sup>23</sup> After the announcement of the first unexpectedly high repayment amounts on January 25, 2013, the average EONIA rates expected for the following months increased considerably. Due to the repayment pattern from the three-year tenders that was observed in the period thereafter, however, the increase was only short-lived.<sup>24</sup>

The excess liquidity has now fallen below the EUR 200bn mark. As a result, ECB President Draghi once again emphasized that this threshold is not a fixed value, but rather depends, in particular, on the extent of fragmentation on the financial markets. It falls when the fragmentation becomes less pronounced.<sup>25</sup> To date, money market rates have remained broadly stable. According to Draghi, although the market had become significantly less fragmented from month to month starting in July 2012, no real improvement had been witnessed since around mid-2013. Instead, the situation was largely unchanged.<sup>26</sup> Consequently, the uniform transmission of the desired monetary policy course to the real economy across the entire euro area is something that the ECB still sees as disrupted due to the fragmentation of the financial markets.

Despite signs that the situation on the financial markets was starting to ease, the ECB cut its key rate by another 25 basis points, bringing it down to 0.5%, at the start of May 2013. Presumably, one of the main reasons behind this decision was the lack of (the much hoped-for) spring revival in the EMU economy. The ECB opted not, however, to experiment with a negative deposit rate, leaving it at 0% instead. Also in May, it introduced an element of forward guidance by assuring the market that it would be maintaining the unlimited liquidity supply until the middle of 2014. In July, it went one

<sup>23</sup> ECB, monthly report for February 2013, p. 37-39.

<sup>24</sup> ECB, monthly report for July 2013, p. 33-35.

<sup>25</sup> EZB, Introductory statement to the press conference (with Q&A) November 2013, p. 4.

<sup>26</sup> EZB, Introductory statement to the press conference (with Q&A) November 2013, p. 5.

step further and set out its expectations for key rates for the first time, stating that they were likely to remain at their current, or at a lower level, for a prolonged period (which was also tantamount to a downward bias). The markets showed a prompt reaction to this new element of the ECB's communication, the previous EMU yield increase was stopped in its tracks and the euro weakened. The latter development was due, first and foremost, to increasing market expectations that the Fed would break ties with its extremely loose monetary policy before the ECB.

When justifying its decision to provide forward guidance on key rates in the future, the ECB said that part of the last key rate cut had effectively been canceled out by rising money market rates.<sup>27</sup> The ECB made use of the forward guidance at a time when the zero interest rate threshold had not yet quite been reached. It is hoped that the new communication tool will result in less volatile money market conditions and more enshrined market expectations thanks to the greater clarity regarding the ECB reaction function.<sup>28</sup> In actual fact, however, the ECB has chosen a relatively weak form of forward guidance: first of all, the ECB does not provide any further details on the "extended period" of its key rate outlook. Second, it ties its outlook to three things – the medium-term inflation outlook, the weakness of the EMU economy and slow monetary development (including lending, see charts below) – this is ultimately nothing other than the full spectrum of economic variables under the two-pillar strategy. Third, although the ECB is giving the markets far-reaching guidance on its future monetary policy stance, this should not be misunderstood as being set in stone, as it merely expresses what the ECB expects to happen.

As a result, the ECB has various options open to it for providing more details on its forward guidance if the latter does not prove to be efficient enough. The Fed or the Bank of England, for example, quantify threshold values for macroeconomic parameters (the unemployment rate), while the New Zealand, Norwegian and Swedish central banks publish key rate projections. It is, nonetheless, important to remember that steps like these could make it more difficult to break with the extremely loose monetary policy if such a break becomes necessary as the economy and lending pick up.

In early November, the ECB then surprised the market in various respects: it cut the key rate by another 25 basis points to 0.25%, although the EMU economy had overcome the recession in the summer. In all other respects, it stuck to the wording of its forward guidance, i.e. continued with the easing bias. This may be because the ECB wants to show that it is still in a position to take action. Furthermore, it guaranteed an unlimited liquidity supply for refinancing operations until mid-2015 – instead of until mid-2014, as it had previously promised. The ECB cited its revised mid-term inflation outlook (less upward pressure) as the reason behind its decision. Now, deflationary concerns are starting to take root in the eurozone. In our view, however, the drop in inflation reflects the desire to regain competitiveness through necessary structural adjustment processes.

In the short term, the ECB presumably sees three factors as being particularly relevant to monetary policy: money market interest rates, bank liquidity and lending development: 1.) The ECB has taken what can be seen as a sort of preventative stance to stop a "critical threshold" for excess liquidity potentially being reached and triggering a reaction in short-term interest rates (see above). By narrowing the corridor between the deposit and the refinancing rate to 25 basis points, it is limiting the volatility of the EONIA rates. 2.) The most recent extension of the unlimited provision of liquidity reflects concerns that the modalities of the Asset Quality Review and, following on from this, the results of some

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<sup>27</sup> ECB, monthly report for July 2013, p. 7.

<sup>28</sup> EZB, Peter Praet: Forward guidance and the ECB, 6. August 2013, p. 4.

stress tests may put pressure on some banks. After all, the entire period of uncertainty should be covered by the timeframe stretching until mid-2015. 3.) As the eurozone economy recovers, lending to the private sector – and in particular to non-financials – should gradually improve. The recent outcome of the Bank Lending Survey was encouraging, but not yet reassuring. Ultimately, the ECB cannot provide targeted support to lending to SMEs. The offer of further refinancing operations with extraordinarily long terms could also be used by banks to buy even more government bonds, which would not be a desirable development from a bank audit perspective given the balance sheet risks. This is why the ECB is currently considering i.a. a long-term tender for earmarked purposes and the resurrection of certain ABS products.

### 3.3. ECB reaction function points to higher key rate level at the end of 2014

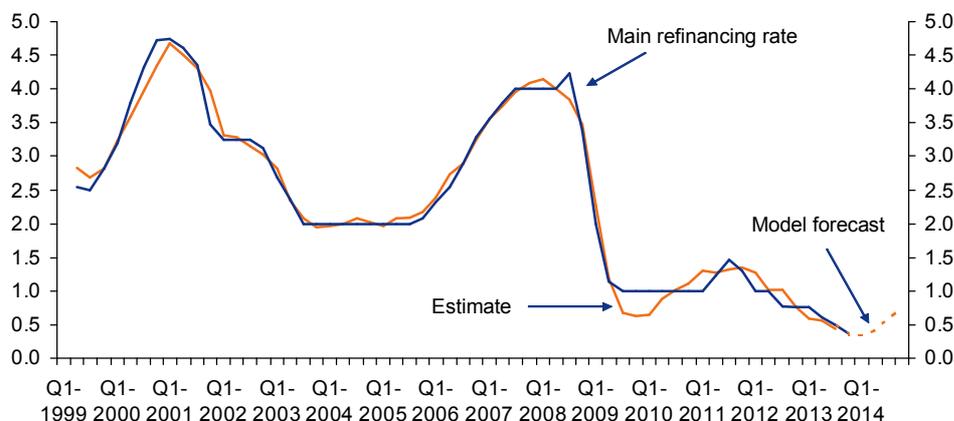
In order to describe and forecast the ECB's rate-setting moves, we have estimated a reaction function based on the quarterly data for the period as of Q2 1999. As far as the indicators of future inflationary pressure are concerned, we have used the inflation forecasts (consumer price inflation over a one-year period) from the Survey of Professional Forecasters (which the ECB conducts and to which it attaches a great deal of importance), the annual rate of change in the nominal external value of the euro (measured against the main trading partners) and the production gap. We have calculated the latter using production potential estimates performed by the European Commission. We have broken down the annual values to produce quarterly data. One alternative in this respect would certainly be survey data collected by the European Commission, e.g. the capacity utilization rate in the industrial sector or the Economic Sentiment Indicator (ESI), as these correlate clearly with the production gap. These indicators are, however, very difficult to predict, if indeed they can be predicted at all.

We have also taken interest rate smoothing by the central bank into account. Three main arguments are usually cited in this respect. First, it is advisable, in times of general economic uncertainty and uncertainty regarding the impact of monetary policy actions, to react carefully to shocks and wait for more and better information before making any moves. What is more, it can be a good idea to avoid any major interest rate movements in order to protect the stability of the financial market. After all, given the forward-looking stance of the private sector, small but constant interest rate hikes can prove more effective than major changes in interest rates.

On the whole, this equation provides a fairly accurate reflection of the development in the main refinancing operations rate. One prolonged period of more marked deviations does, however, emerge in 2009 and 2010, when a number of unconventional measures were taken alongside the interest rate policy moves. At the current end of the chart (Q3 2013), however, the deviation is minimal, at less than 0.1 percentage points.

## ECB key rate and interest rate reaction function

### Quarterly figures



Sources: EcoWin, own calculations.

As far as future developments are concerned, we expect the eurozone economy to continue to gain ground and achieve average growth to the tune of 1 ½% in 2014. This will see a continuation of the (negative) production gap. We do not expect inflation expectations to become any less pronounced over the year. Finally, we have assumed that the external value of the euro will start by losing a little ground over the coming months, before stabilizing as the year progresses.

Provided that these conditions materialize, we will see a trend towards rising key rates in the course of 2014. According to the model projections, the key rate level could have been lifted to 0.5%-0.75% by the end of 2014. In order for the monetary reins to be tightened, however, the euro debt crisis will have to continue to abate and the associated special challenges facing the ECB will have to become less of an issue – such as the negative feedback between bank and state financing, the exceptional heterogeneity that has created financing conditions in the real economy that are not consistent with key rates throughout the eurozone and that has also manifested in a real risk of contagion between EMU countries.

Although the ECB appears to have the capacity to act in terms of further easing, with regard to both key rates and unconventional measures, our model forecast argues against a further rate cut and suggests that the ECB is likely to remove the easing bias from its forward guidance on key rates in the scenario that we deem to be most likely – possibly in the second quarter of this year. Towards the end of 2014/early 2015, we then expect the ECB to take its first tightening step, lifting rates to 0.5%. In this respect, it is important to bear in mind that the period covered by the forward guidance on key rates is not, in the words of the ECB, directly linked to the period for which the latter has guaranteed an unlimited supply of liquidity. The fact that the ECB has extended this liquidity supply until mid-2015 is somewhat inconsistent with its usual emphasis on its wish to structure any special monetary policy measures in a manner that is consistent with its later exit. After all, this rather long-term policy is not subject to any conditions, unlike the forward guidance for key rates. The question that arises is to what extent the ECB could backtrack from this if necessary. Otherwise, an exit from the unconventional supply of liquidity would come in mid-2015. It could opt to suspend other special measures, such as the reduction in the minimum reserve ratio or the expansion of the collateral framework, before this point in time, although this would not be as significant.

#### **4. CONCLUSION: THOUGHTS ON HOW TO BID FAREWELL TO THE CRISIS POLICY**

The Federal Reserve and the European Central Bank have come up with a whole number of new gadgets to react to the financial crisis and the ensuing fragile economic development. But the features of these quantitative easing measures vary considerably due to the differences in the importance of the banking sector in the respective financial systems and as a result of the transmission problems created by the sovereign debt crisis in the euro area. While the development of the ECB's balance sheet is determined by the refinancing operations, the Federal Reserve's balance sheet has accumulated considerable surplus reserves due to the bond purchases. This explains why the ECB's total assets have fallen considerably since the start of the year, whereas the Fed's have been on an uninterrupted climb.

The central banks have also been trying out new approaches in their communications policy in order to steer the interest rate expectations of market participants. The Fed is attempting to stipulate threshold values for real economic indicators to signal a deviation from its historical reaction patterns. By stating that it will be keeping key rates lower for longer than in the past, despite the outlook for unemployment and inflation being comparable, its intention is to provide the economy with additional stimulus. The ECB has not gone this far and has not put any figures on threshold values. But the fact that it has been repeating, on a monthly basis, its expectation that key rates will remain at the current, or at a lower, level for a prolonged period, provided that inflation, the economy and monetary momentum remain as they are, has also been very well received by the markets.

All in all, we believe that the forward guidance from the Fed and the ECB has served to ensure that the financial markets are keeping a more nervous eye on changes to some, usually volatile, indicators in order to be able to draw conclusions as to the timing and scope of possible monetary policy corrections. There is a risk that this will exacerbate market fluctuations.

Looking ahead to future monetary policy, we believe that the Fed is likely to continue to slowly but surely break away from its bond purchase program. This theory is supported by the fact that the economic recovery is gaining ground. With the slight modification to its forward guidance for the key interest rate, however, the Fed wants to push expectations of rising key rates even further into the future. The path towards the full termination of the asset purchase program is likely to take a number of quarters. As a result, key rate hikes are likely to come in the first half of 2015 at the earliest.

If we follow the current market expectations, the ECB is also unlikely to lift its key rates before the start of 2015. This is assuming that the EMU economy continues to recover, that fewer restrictions are placed on lending and that inflation rates start to pick up slightly again. A key part of the unconventional exit – the break with the unlimited liquidity supply for refinancing operations – on the other hand, will come in the second half of 2015 at the earliest. This is primarily to be seen as a way of reassuring the market that the Asset Quality Review and stress tests will not fuel another crisis of confidence regarding the solidity of the European banking sector and state finances.

The conditions for the monetary policy exit from the "crisis mode" are very different on the two sides of the Atlantic. As a result, we believe that it would make sense to choose a different sequence for the exit moves.

- Given the more robust US economy and the return to more stable US financial markets, the Fed should aim to reduce and put an end to the bond purchases as soon as possible. After all, even reduced bond purchases equate to a further flood of liquidity, meaning that they still pose a certain risk to financial market stability ("Hunt for returns", increased risk appetite among investors, misallocation of capital). Since the bond purchases are aimed primarily at influencing the interest rate level on the capital and mortgage markets, the central bank will, in line with its announcements, only start to change key rates once the bond purchases have been reduced. It is bound to be difficult enough to reduce the expansive asset purchases without any significant market reaction, which is why the Fed will be keen to further reinforce the expectation that central banks rates will remain extremely low as an anchor for longer-term interest rates. It remains to be seen to what extent this will prove successful given the quantitative threshold values, in particular an unemployment rate of 6.5% as part of the forward guidance. If the data are good (and the inflation rates are no longer quite as low), the negative side of the wish to stick to the rules could emerge in the form of early rate hike expectations on the market, which would not suit the Fed. As a result, it may opt to ease up on the extent to which it is determined to stick to the rules and open up discretionary leeway.
- The ECB's situation looks a little different. At the beginning of the year eurozone inflation fell to 0.7%. That fueled the debate whether the European Central Bank should agree on further expansionary measures at its February meeting. That would not be advisable. Yes, inflation is currently below the ECB's reference value of close to 2%, but this deviation is not critical. The current inflation rate is being pushed down by lower energy prices, a positive but probably temporary feature. More importantly, in a number of countries falling unit labor costs are keeping price levels stable or, as in Greece, actually pushing them down. This is not only desirable but also vital in order to bolster external competitiveness and, closer to home, purchasing power and domestic demand. It is no coincidence that economic sentiment is improving in those countries with major adjustment needs. For the first time in a long while capacity utilization in the eurozone has risen and lending terms for small and medium-sized companies are no longer being tightened but relaxed. Stable inflation is not prompting consumers to sit on their wallets, rather we are seeing a fall in saving rates in most countries.
- Further rate cuts are not called for, but further liquidity assistance, yes. One of the main problems is that the interbank market has not yet been restored and that numerous banks, especially from countries grappling with economic and sovereign debt problems, are still relying on the central bank to provide them with liquidity. This is also evident from the high Target 2 balances of the European System of Central Banks, which shows the considerable use being made of the ECB's credit facility, particularly by banks on the southern edges of the continent (and from the sustained low level of money market transactions, also due to the fear of counterparty risks). In a situation dominated by a lack of trust on the interbank market, the ECB is unlikely to allow any doubts to surface regarding its function as the "lender of last resort" and can be expected to stick to its policy of unlimited access to liquidity, also for longer maturities. After all, this is what the ECB has been hinting at in its guidance. This does not, however, mean that the liquidity should be made available to the banking system virtually free of charge. A moderate increase in central bank rates alongside the unlimited supply of liquidity would definitely not usher in a bank crisis. An increase in key rates would probably push money market rates up more or less proportionately, making banks with strong liquidity resources more likely to make funds available to the money market again. This applies, in

particular, if the deposit rate continues to hover close to zero. For those banks seeking liquidity, ECB financing would become slightly more expensive, but they would also stand to gain more on the money markets. The ECB's current easing bias, which continues to promise low, or even further cuts in, interest rates, could end up slowing down the necessary adjustment process to bank balance sheets – a process that is crucial in order to re-establish full access to the money market.

Would an interest rate turnaround on the ECB's part come hand-in-hand with economic risks? One risk is that of an exaggerated reaction on the part of the financial markets, sending capital market yields soaring in all eurozone countries. This sort of risk, however, is part and parcel of any exit and calls upon the central bank to choose an appropriate communication strategy in order to stabilize market expectations. Could a key rate hike deal a hefty blow to the conditions for corporate financing? This is unlikely for several reasons. In many countries, the waning lending activity is a sign of deleveraging in the corporate sector and among private households after years of excessive debt accumulation. So the drop in loans is due in part to demand factors. The restraint shown by banks on the lending front has nothing to do with money market interest rates or a general shortage of liquidity, but is a logical consequence of their desire to reduce risks and a reflection of the relatively small capital base that many banks still have. The interbank money market rate level is not a decisive factor, particularly not when it comes to explaining the funding bottlenecks faced by SMEs. In addition to the state programs designed to boost SME financing, another suitable course of action would be to support the market for loan securitization. Ultimately, it is important to remember that the yield differentials on the markets for government bonds in the eurozone reflect different market assessments of the credit ratings of the states themselves. The European Central Bank can, if at all, only influence these differences on a temporary basis with its controversial bond purchases or purchase commitments; it cannot use the key rate level to change them.

So a moderate correction to key rates could be the first step towards the ECB's exit from its crisis policy, provided that the economic development remains positive. The risks are limited. On the other hand, however, it would send out an important signal to the financial markets that the extreme policy will not be a long-term feature. Despite the caution that has to be exercised in ensuring that the ECB does not break with this policy too early, the risks of sticking to an expansive policy for too long should not be underestimated either. International organizations like the OECD or the BIS have also made repeated references to these risks. Let us finish with a quote from the 83rd Annual Report of the BIS:

"Prolonged low policy rates tend to encourage aggressive risk-taking, the build-up of financial imbalances and distortions in financial market pricing. This environment has also created incentives to delay necessary balance sheet repair and reforms. These incentives have been sending the wrong signals to those fiscal authorities with serious long-term sustainability issues and to those financial institutions which have not gone far enough in recognising losses and increasing capital and have been evergreening loans."<sup>29</sup>

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<sup>29</sup> Bank for International Settlements, 83rd Annual Report, Basle, June 2013, p. 84.

## APPENDIX: TAYLOR INTEREST RATE

Interest rate rules create a link between the short-term interest rate, which the central bank can control, and key macroeconomic indicators. These include indicators that represent the ultimate aim of monetary policy. The best-known interest rate rule is the Taylor rule. It combines the advantages of a straightforward model with the intuitive understanding that central banks and their key rate adjustments could counteract demand shocks and be cautious in their reaction to supply shocks.

The Taylor rule determines variations in the appropriate key rate level at the point in time "t" ( $i_t$ ) depending on the inflation gap ( $p_t - \bar{p}$ ), i.e. the difference between the rate of inflation and the central bank's target rate and the production gap ( $y_t - \bar{y}$ ), i.e. the relative gap separating macroeconomic production from its potential level (in this case, approximated using the logarithmic difference between the two parameters). The key rate level is calculated as follows:

$$(1a) \quad i_t = \bar{r} + p_t + a_1(p_t - \bar{p}) + a_2(y_t - \bar{y})$$

or, after remodeling

$$(1b) \quad i_t = \bar{r} + \bar{p} + (1 + a_1)(p_t - \bar{p}) + a_2(y_t - \bar{y})$$

Parameters  $a_1$  and  $a_2$  determine how aggressively monetary policy should react to differences between the inflation rate and its target, and between production and its potential value. If the rate of inflation and macroeconomic production are in line with their target values, then the nominal key interest rate is at its equilibrium level:

$$i_t = \bar{r} + \bar{p}$$

Here,  $\bar{r}$  is the real equilibrium interest rate. This is the real interest rate level at which the long-term equilibrium is not changed by monetary policy.

When applying the above to US monetary policy, Taylor assumed a value of 2% for both the balanced real federal funds rate and the inflation target. The reaction coefficients were not estimated, but rather a value of 0.5 was set in each case. The interest rate rule therefore becomes:

$$i_t = 4 + 1,5(p_t - 2) + 0,5(y_t - \bar{y})$$

Kahn<sup>30</sup> cites the following reasons for the popularity of the Taylor rule:

- Simple and transparent
- Aligns well with the Fed's dual mandate
- Anchors inflation over the long run at an assumed 2% rate
- Approximates the "optimal" policy rule across a number of macroeconomic models (robust monetary policy instructions to stabilize inflation and production)
- Calls for an increase in the nominal funds rate by more than one-for-one in response to an increase in inflation, thus ensuring that the real funds rate would rise when inflation rose.

<sup>30</sup> Kahn, George A., „Estimated Rules for Monetary Policy“, Federal Reserve Bank of Kansas City Economic Review, 4<sup>th</sup> Quarter 2012.

Interest rate rules that use the same structure as, but different coefficients than, the Taylor rule, are often called Taylor-type rules.

Fundamentally, the empirical implementation of this concept is not straightforward. All of the variables that are included in the function have to be measured and defined in a precise manner. The estimate of the production gap, for example, depends on the method chosen, given the large number of approaches that can be used to gauge production potential. Depending on the method selected, more pronounced differences are possible, which have an impact on the level and development of the Taylor interest rate.

The problem with Taylor-type interest rate rules is that nominal interest rates cannot be negative. If nominal rates drop back to a very low level, Taylor rules become increasingly less effective as "good" monetary policy instructions for stabilizing inflation and production.

These assessments are, as always, subject to the disclaimer provided below.

#### **ABOUT ALLIANZ**

Together with its customers and sales partners, Allianz is one of the strongest financial communities. Around 78 million private and corporate customers rely on Allianz's knowledge, global reach, capital strength and solidity to help them make the most of financial opportunities and to avoid and safeguard themselves against risks.

In 2012, around 144,000 employees in over 70 countries achieved total revenue of 106.4 billion euros and an operating profit of 9.3 billion euros (restated on January 1, 2013 due to a change in accounting standard and presentation). Benefits for our customers reached 89.2 billion euros.

This business success with insurance, asset management and assistance services is based increasingly on customer demand for crisis-proof financial solutions for an aging society and the challenges of climate change. Transparency and integrity are key components of sustainable corporate governance at Allianz SE.

#### **CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS**

The statements contained herein may include prospects, statements of future expectations and other forward-looking statements that are based on management's current views and assumptions and involve known and unknown risks and uncertainties. Actual results, performance or events may differ materially from those expressed or implied in such forward-looking statements.

Such deviations may arise due to, without limitation, (i) changes of the general economic conditions and competitive situation, particularly in the Allianz Group's core business and core markets, (ii) performance of financial markets (particularly market volatility, liquidity and credit events) (iii) frequency and severity of insured loss events, including from natural catastrophes, and the development of loss expenses, (iv) mortality and morbidity levels and trends, (v) persistency levels, (vi) particularly in the banking business, the extent of credit defaults, (vii) interest rate levels, (viii) currency exchange rates including the Euro/U.S. Dollar exchange rate, (ix) changes in laws and regulations, including tax regulations, (x) the impact of acquisitions, including related integration issues, and reorganization measures, and (xi) general competitive factors, in each case on a local, regional, national and/or global basis. Many of these factors may be more likely to occur, or more pronounced, as a result of terrorist activities and their consequences.

#### **NO DUTY TO UPDATE**

The company assumes no obligation to update any information or forward-looking statement contained herein, save for any information required to be disclosed by law.