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Impact of monetary policy on yields

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**Executive summary**

- The yields on long-term bonds no longer tie in with fundamental economic data like inflation and economic growth. The deviations can be explained by the impact of monetary policy.
- A marked change has meanwhile occurred in the way the ECB reacts to key fundamental data like inflation and capacity utilization. If earlier reaction patterns were to still apply, the ECB would have already ushered in the interest rate turnaround given higher inflation and improved capacity utilization. As key rates and the bond purchasing program influence long-term interest rates, the connection between fundamental data and long-term interest rates has loosened considerably.
- Our monetary explanation approach for long-term interest rates in Germany returns actual values that are very close to values for the estimation period between 2000 and early-2017, with a declared variance of almost 99%. The yield-reducing effect of the ECB's bond-purchasing program equates to an estimated 77 basis points.
- We have then used three scenarios with different assumptions concerning ECB policy and US yields to estimate the potential trajectory of long-term rates in Germany until the end of 2019. Depending on the scenario, German long-term interest rates will climb to between 1.5% and 2.5% by the end of 2019. In all three scenarios we have assumed that the bond-purchasing program is phased out.

## The impact of monetary policy on bond yields in the eurozone: An update

Although there were times last year when the yields on long-term EMU benchmark bonds (10-year German government bonds) slipped below the zero mark, they are now back in positive territory, but still remain extremely low at 0.3% for ten-year bonds of late. These yields do not tie in with fundamental economic data like inflation and economic growth. So far in 2017, the eurozone inflation rate has hovered between 1.3% and 2.0%, that is, not too far removed from the ECB's inflation norm. Capacity utilization levels in the euro area are also close to normal. Hence, given medium-term productivity growth of 0.5%-1% a year, benchmark yields of 2-3% would be a fairly "normal" level. However, this is still some way off.

In other words, this means that inflation and the economy alone are not enough to explain the level of yields on the capital market. These days there is little dispute that monetary policy has a considerable influence on long-term interest rates. Since the financial crisis, the ECB has been providing unlimited liquidity, has cut key interest rates to zero and, since 2015, has been buying considerable amounts of bonds. Our investigations showed that monetary policy was the main factor behind the decline in long-term interest rates from at times over 4% in 2008 to temporarily below 0%.

Fundamentally, monetary policy decisions are made based on inflation and the economy. This is the underlying thinking behind the so-called Taylor rule that is frequently used to understand central bank reaction patterns. However, given the crises of the past ten years and the plethora of unconventional monetary policy measures, the stability of

the reaction patterns is questionable. This applies especially to the European Central Bank as its strategy is anyway based on a complex approach (inflation target, two-pillar strategy).

In a first step we look at whether the interest rate policy currently pursued by the ECB is still consistent with the reaction patterns it tended towards in the past. Secondly, we look at the impact of monetary policy on current long-term interest rates. Thirdly, we illustrate what sort of long-term interest rate developments can be expected by 2019 under different monetary policy scenarios. This analysis is an update of the regression analyses we presented in Working Paper 186 (June 2015) and Working Paper 204 (November 2016).

We have attempted to replicate the ECB's interest rate policy reaction pattern for the period between 2000 and 2016 using a modified Taylor Rule in line with the approach used in Working Paper 204 (November 2016). According to said approach, the main refinancing rate of the ECB will depend on the output gap (deviation from normal capacity utilization levels) and the inflation gap (deviation from the ECB's inflation target), as well as from the main refinancing rate seen in the past. The latter is justified by the argument that the European monetary authorities prefer to pursue a steady-hand monetary policy. Hence, they try to avoid abrupt, dramatic changes of course, even when the overall economic conditions change, and prime the markets for any interest rate moves in advance.

The interest rate policy reaction function can be used to explain a hefty 97% of the variance in the main refinancing rate seen in the period from 2000 to 2016. So, at first glance, it seems that the decisions made by the ECB follow a stable reaction pattern. And yet, a look at 2016 shows estimated values during the course of the year that are systematically higher than the actual key interest rate, which remained at zero. Based on our previous reaction pattern forecasts, the ECB would have to jack up key interest rates fairly swiftly as early as 2017, continuing this trend across 2018 and 2019. As things stand, such a policy is extremely unlikely. It is obvious that the ECB has modified the way it reacts to key fundamental data like inflation and capacity utilization levels considerably. But this also suggests that the correlation between inflation and economic growth on the one hand and long-term interest rates influenced by monetary policy on the other has become weaker and less stable.

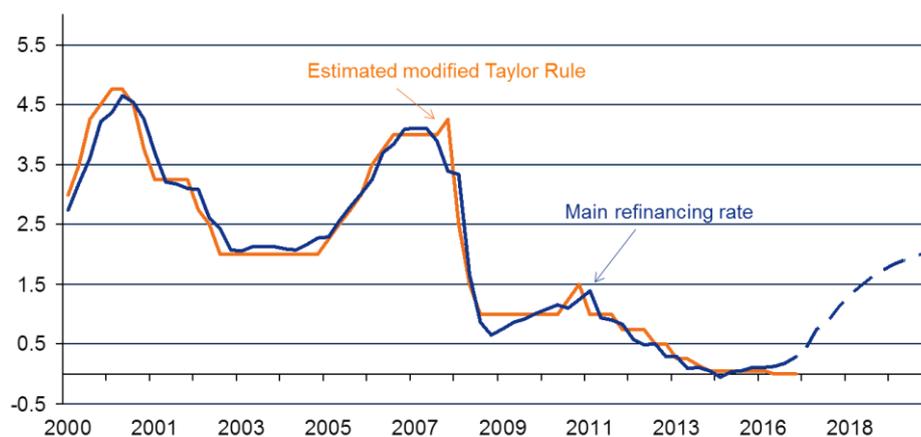
### Dependent variable: ECB's main refinancing rate<sup>1</sup> Estimation period: 2000 Q1 2016 Q4

	Coefficient	Standard error	t-statistic
Constants	0.272	0.145	1.88
Inflation rate	0.485	0.168	2.88
Output gap	0.791	0.108	7.31
Main refinancing rate for the previous quarter	0.779	0.035	22.41
Coefficient of determination	0.971		
Standard error	0.255		

<sup>1</sup> Estimation based on quarterly data (due to the usage of time series from National Accounts)

## ECB main refinancing rate and estimated modified Taylor Rule

Estimates and actual values (2000Q1 to 2016Q4)



Monetary factors dominate the trend in long-term interest rates. The monetary regression approach we developed based on monthly data (Working Paper 186, June 2015) indicates that the yield on 10-year German government bonds is contingent upon the short-term interest rates in the euro area, the bond-purchasing program of the ECB and the international yield context (represented by short and long-term interest rates in the US). Below we outline our approach and the results in more detail:

- With its key rates, the ECB largely controls interest rates on the interbank market. In recent years, however, money market rates have been lower than the ECB's main refinancing rate – sometimes considerably so. This is primarily attributable to the unlimited liquidity provided by the ECB to commercial banks and the increasing role played by the rate for the deposit facility. This is why the monetary policy pursued by the ECB is reflected a lot more in the money market rates than it is in the main refinancing rate. As a result, we have included the three-month Euribor rate in our estimate approach for German long-term interest rates.
- German long-term interest rates are influenced by developments on the international financial markets, with the greatest influence on the European market likely to be exerted by its US counterpart. This is what motivated us to include long-term US yields (yields on ten-year US government bonds) in the model for estimating German long-term interest rates. As expected, these proved to be of tremendous significance. However, it would appear that, since 2013, US long-term interest rates have been having less of an impact on their European counterparts. Positive economic developments prompted the Fed to announce, at the end of May 2013, that it would be winding down its bond purchases. The Fed's purchase program came to an end in October 2014. Since June 2013, the policy pursued by the Fed has diverged sharply from that pursued by the ECB, with the latter having ramped up its expansive measures further since then. This potential structural shift is reflected in the much lower US yield coefficient from June 2013 onwards (0.65) compared with the coefficient for the period from 2000 to May 2013 (0.83).

In addition to the above, we have also included the short-term interest rate spread (three-month Euribor minus US three-month interbank rate) in our regression approach. This variable also shows a highly significant positive coefficient. This could, however, give rise to the question as to why an increase in US short-term interest rates, coupled with unchanged EMU short-term interest rates, pushes the yield on

German long-term interest rates down. However, this would only be the case if the increase in US short-term interest rates does not push up the yield on US long-term interest rates. In such an event, the US yield curve would start to flatten out, simply because long-term interest rates do not mimic the upward trend recorded for short-term interest rates. The interaction of the markets is also likely to produce a flatter yield curve for Germany.

- In order to quantify the impact the ECB's bond-purchasing program has on the yield level, we have used a so-called dummy variable. This binary variable uses "ones" as of the third quarter of 2014 to represent the effect of the bond-purchasing program as anticipated by the markets. The variable assumes a value of 0 for the period outside of quantitative easing (QE). The program was first implemented in March 2015 and continues to the present day.

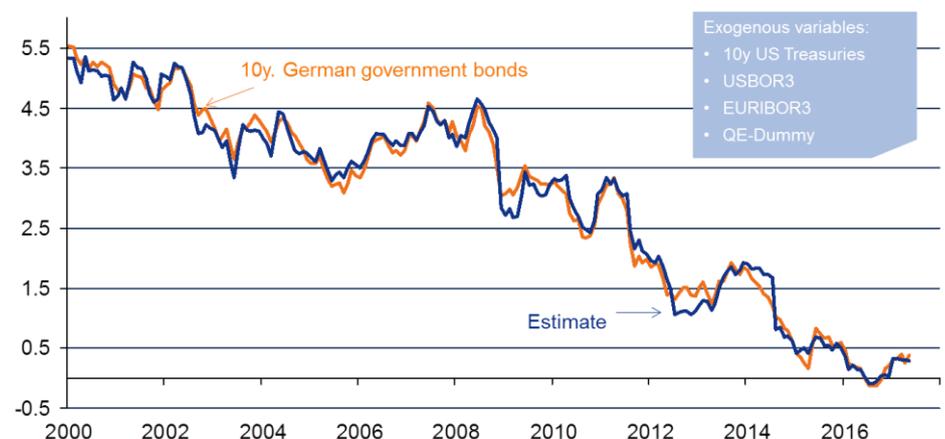
**Dependent variable: 10-year German government bonds**  
**Estimation period: January 2000 to April 2017**

	Coefficient	Standard error	t-statistic
10-year US government bonds (before June 2013)	0.839	0.010	82.86
10-year US government bonds (after June 2013)	0.654	0.015	42.40
EURIBOR3	0.133	0.014	9.58
EURIBOR3-USBOR3	0.256	0.011	23.51
QE dummy from 2014Q3	-0.749	0.045	-16.69
Coefficient of determination	0.987		
Standard error	0.179		

EURIBOR3: EU Interbank Offered Rate, 3 months  
 USBOR3: USA Interbank Offered Rate, 3 months

**Yield on 10-year German government bonds**

Estimates and actual values (January 2000 to May 2017)



The monetary explanation approach returns estimated values that are extremely close to the actual values for the period between 2000 and early-2017. Only 1.3% of the spread remains unexplained. The standard error comes in at only around 18 basis points. According to this model, raising short-term interest rates in the euro area by 100 basis points would push long-term interest rates in Germany up by almost 40 basis points. The

estimated yield-reducing effect of the bond-purchasing program comes in at a sizeable 77 basis points.<sup>2</sup> These estimate results are testimony to the considerable impact that monetary policy has on bond market yields.

### Yield on 10-year German government bonds

Estimates and actual values (January 2000 to May 2017)



This means that in order to be able to predict how long-term interest rates are likely to develop, what we need more than anything else is to make assumptions concerning future monetary policy and US growth. We have created three scenarios to try and figure out what German long-term interest rates are likely to look like over the next few years until the end of 2019. In our base scenario, we have assumed that the ECB's bond-purchasing program will peter out from early to mid-2018 and that the ECB will raise its main refinancing rate twice in 2019. In addition to the above, we have also assumed that long-term interest rates in the US will have climbed to 3.3% by the end of 2018 and to 3.8% at the end of 2019. When it comes to US short-term interest rates, we are predicting an increase to 2% by the end of 2018 and to a good 2.5% before the end of 2019. Such a scenario is likely to be consistent with a moderate reflationary policy. The second scenario assumes moderate economic development and hence a more expansionary monetary policy than the one seen in the base scenario. It is based on the hypothesis that the ECB will not start to reduce its bond purchases until April 2018 and that the bond-purchasing program will continue until the end of 2018. Furthermore, we have assumed that the ECB will keep its main refinancing rate at zero until the end of 2019. We have also made the assumption that long-term interest rates in the US will have only gone up to 3.0% by the end of 2019, with their short-term counterparts increasing to only 2%. Scenario 3 assumes a buoyant economy and therefore a more restrictive monetary policy than the one seen in the base scenario. The ECB wraps up its bond-purchasing program completely in the first half of 2018 before nudging the main refinancing rate up in several increments starting from mid-2018 until it reaches 1.5% at the end of 2019. US long-term interest rates will climb to 4.5% by the end of 2019, and US short-term rates to 3.5%.

All three scenarios suggest that we will see ten-year government bond yields embark on an upward trend in the medium term. The outcome of the model calculations is hardly surprising considering all three scenarios rest on the assumption that the bond-purchasing program will come to an end, which is estimated to push rates up by 77 basis points. While the base scenario and scenario 3 see a considerable rise in ten-year gov-

<sup>2</sup> An estimation by the ECB delivered a similar result. According to their calculations, the yield-reducing effect of monetary policy measures on long-term risk-free rates amounts to 80 basis points since June 2014. See Benoît Cœuré: Dissecting the yield curve: a central bank perspective (16.05.2017).

ernment bond yields as early as by the middle of 2018, the second scenario assumes long-term interest rates in Germany to take a lot longer to gather momentum, mainly as a result of the bond-purchasing program carrying on for longer. Needless to say, the differences in the progression of yields seen in all three scenarios can also be traced back to the different assumptions underlying interest rate developments in the US. According to our scenarios, long-term interest rates in Germany would climb to between 1.5% and 2.5%, depending on the scenario, by the end of 2019. While this would equate to a pronounced increase in yields, real bond yields would still remain extremely low as a result of the inflation rates that are to be expected.

As welcome as interest rates like these would be for savers and to prevent capital misallocation, the financial markets could well turn out to be a turbulent place before this higher level is reached. We do, however, assume that the ECB will explain any adjustments to its policy with a carefully considered forward guidance in order to avoid a sharp response from the markets. We probably won't have to wait too long before this type of advance information is released for the bond-purchasing program.

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