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Special Report

Central bank divergence across Western Europe

- **We find the Taylor rule a powerful tool to help understand central banks. As far as Western Europe is concerned, a standard Taylor rule suggests that there are three groups: those that should be tightening (the Bank of England and the Norges Bank), those that should be easing (the European Central Bank and the Danish Nationalbank) and those that should be holding policy relatively steady (the Riksbank and the Swiss National Bank).**
- **The central bank under the most pressure to tighten, according to the Taylor rule, is the Norges Bank. However, it is not following the Taylor rule, due to the shock to the real economy from lower oil prices. Indeed, we expect another rate cut. But, as the oil price shock fades, we believe the Norges Bank will respond to the pressure from the Taylor rule with a rate hike towards the end of 2016. But, we expect it to move slowly relative to the Taylor rule, due to the persistent monetary ease in the Euro area and the risk of upward pressure on the currency.**
- **The Bank of England is also under pressure to tighten. But, this will start later, and progress more slowly, than the Taylor rule suggests is appropriate, in our view. The Bank of England remains concerned about headwinds, inflation expectations, the currency and additional slack. As policy starts to tighten, it will likely become concerned about greater interest sensitivity due to elevated debt.**
- **For the Swiss National Bank and the Riksbank, there is not much fundamental macro pressure on monetary policy. For the Swiss National Bank, the macro pressure on monetary policy will be determined by how the economy is impacted by the recent currency appreciation, and how much more upward pressure on the currency there is. In Sweden, we do expect a modest amount of easing later in the year, as subdued inflation expectations limit the rise in inflation relative to the Riksbank's forecast.**
- **The Danish Nationalbank is under pressure to ease, according to the Taylor rule and indeed it has to match the ECB easing in order to sustain the currency peg. This is fully warranted by our Taylor rule analysis.**
- **The ECB faces the most pressure to ease and has launched an open-ended sovereign QE program. Judging by our Taylor rule analysis, the balance sheet expansion required to achieve macroeconomic balance over a reasonable horizon is large—likely around €2tn. The ECB will be under pressure to do more for an extended period.**

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After a long period of limited movement, this year is generally expected to see all Western European central banks in motion. In order to gauge the extent of this motion, we like to use a Taylor rule framework (see "Pressures forcing the G4 central banks apart," *Global Issues*, July 16, 2014). Over time, the Taylor rule has proven to be useful in evaluating how inflation targeting central banks will behave as they seek to meet their macroeconomic objectives over a reasonable horizon.

The Taylor rule does not indicate precisely what central banks will do. But, it does illustrate the direction of movement and the extent of the pressure. It also helps to illustrate when central bank adjustments will not be as data dependent as at other times. If a central bank's policy stance is a long way away from the Taylor rule, then policy adjustments will not be as sensitive to the contemporaneous data flow as they would be if the policy stance were close to the Taylor rule.

Our Taylor rule analysis suggests that central banks in Western Europe should be divided into three groups: those that should be tightening (the Bank of England and the Norges Bank); those that should be easing (the European Central Bank and the Danish Nationalbank); and those that should be holding policy relatively steady (the Riksbank and the Swiss National Bank). In this report, we consider the central banks in descending order relative to the pressure coming from the Taylor rule, from the Norges Bank facing the most pressure to tighten to the European Central Bank facing the most pressure to ease (see adjacent table).

According to the Taylor rule, the Norges Bank is under the most pressure to tighten monetary policy this year, reflecting limited slack in the labor market and core inflation close to the central bank's target. However, we actually expect the Norges Bank to ease, reflecting the real economy shock from lower oil prices. But, over time, the oil price shock will fade and we expect core inflation to move above the Norges Bank's objective. The Norges Bank will respond to the Taylor rule later in 2016, in our view.

In the UK, the Taylor rule suggests that rate normalization should already have begun. Ignoring the impact of the expanded balance sheet, the Taylor rule suggests that the policy rate should be 1.3%. If we include the impact of QE, then the policy rate should be closer to 2.1%. The Bank of England's decision to start normalizing rates later than the Taylor rule would suggest is appropriate reflects concern about headwinds, inflation expectations, the currency and additional slack. However, we do expect normalization to begin later this year, as the labor market continues to tighten and as inflation firms. Nevertheless, we expect the Bank of England to move slowly relative to the Taylor rule. At the end of 2016, our forecast of the policy rate is less than half of the Taylor rule estimate of the appropriate rate. As normalization proceeds, the Bank of England also will be concerned about greater interest sensitivity due to the elevated level of debt. However, it is important to note that a gradual path for policy normalization in the UK does require some supply side improvement.

Western European central bank policy rates

Central bank	Key interest rate	Current level (%)
ECB	Marginal lending facility	0.30
	Main refinancing rate	0.05
	Main deposit facility	-0.20
Riksbank	Repo rate	-0.10
	Debt certificates	-0.10
Norges Bank	Sight deposit rate	1.25
SNB	3M CHF Libor target band	-1.25, -0.25
DNB	Lending rate	0.05
	Current-account rate	0.00
	Discount rate	0.00
	Certificate of deposit rate	-0.75
Bank of England	Bank rate	0.50

Source: National central banks

Calibrated Taylor rules used in analysis
%

	Neutral real policy rate		NAIRU		Inflation Target	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
UK	3.0	1.3	5.1	5.1	2.0	2.0
Euro area	1.0	0.0	8.6	9.0	2.0	2.0
Sweden	1.5	0.5	7.0	7.0	2.0	2.0
Norway	3.0	1.3	3.25	3.25	2.5	2.5
Switzerland	1.0	0.0	3.5	3.5	2.0	2.0
Denmark	1.0	0.0	4.5	4.5	2.0	2.0

Source: J.P. Morgan estimates

The change in the neutral real policy rate is assumed to have taken place in January 2009.

Central bank Taylor rule gaps—latest data

	Policy rate (%)	Taylor rule with core CPI (%)	Taylor rule with headline CPI (%)	Gap - with core CPI (%-pt)	Gap - with headline CPI (%-pt)
Norges Bank	1.25	2.9	1.8	-1.7	-0.6
Bank of England	0.5	1.3	0.2	-0.8	0.3
SNB	-0.75	0.2	-1.2	-1.0	0.5
Riksbank	-0.1	-0.1	-2.2	0.0	2.1
DNB	-0.75	-2.5	-4.1	1.8	3.4
ECB	0.05	-3.4	-5.8	3.5	5.9

Source: National central banks, national statistics offices, J.P. Morgan

The Swiss National Bank policy stance looks too easy relative to the Taylor rule at the moment, but this gap will close as the economy responds to the recent currency appreciation. Downward pressure on growth and inflation will reduce the appropriate policy rate in Switzerland, narrowing the Taylor rule gap.

The Riksbank's policy stance is close to the Taylor rule, but it feels pressure to ease further from subdued inflation expectations and concern about currency appreciation. We expect policy to be steady in the first half of the year, as suggested by the Taylor rule. However, we anticipate a modest ease in the second half of the year, as subdued inflation expectations prevent inflation from picking up in the manner anticipated by the Riksbank.

According to the Taylor rule, the Danish Nationalbank is under pressure to ease significantly. It is also under pressure to match the ECB's policy ease, in order to sustain the currency peg. This is fully warranted by the Taylor rule. The Danish Nationalbank may need to go even further to limit speculative pressure on the currency peg.

Our analysis suggests that prior to the decision to implement sovereign QE, the ECB was a long way away from the Taylor rule, around 350bps. Whether this will remain the case depends on how we translate a balance sheet expansion into a policy rate equivalent. Our judgment is that the ECB has taken a big step towards closing the gap between the policy rate and the Taylor rule, but not completely. This means it will remain under pressure to do more.

In our view, central banks in Western Europe will respond to the pressure highlighted by the Taylor rule, but only partially. This creates some risk that they will miss their macroeconomic objectives over the medium term. In the UK and Norway, the risk is that inflation eventually exceeds the central banks' objectives. In the Euro area and Denmark, the risk is that inflation remains well below the central banks' objectives. Although not suggested by the Taylor rule, the risk in Sweden and Switzerland is also for a sustained inflation undershoot, due to low inflation expectations, and possible upward currency pressure, due to persistently easy policy in the Euro area.

The specification of the Taylor rule

Our analysis uses a standard Taylor rule that has a coefficient of 1.5 on the gap between core inflation and the inflation objective and a coefficient of 1.0 on the output gap. Instead of using the output gap, we actually use the gap between the natural rate of unemployment and actual unemployment. The Okun coefficient used is 1.5, which means that a 1%-pt deviation in unemployment from the natural rate of unemployment is equivalent to a 1.5%-pt output gap.

Two judgments need to be made to make this Taylor rule operational: the level of the neutral real policy rate and the level of the natural rate of unemployment. The table on the previous page shows our assumptions for each country. Across the region, we assume that the neutral real policy rate has fallen since the crisis, reflecting lower growth potential, wider disintermediation margins and greater regulation of the financial sector. We assume that natural rates of unemployment have remained steady, except in the Euro area where we assume a small increase.

Being away from the Taylor rule

The Taylor rule is a good starting point for thinking about the appropriate policy stance: the policy stance that will deliver macroeconomic balance—full employment and price stability—over a reasonable horizon. But, there are many reasons why central banks will want to deviate from the Taylor rule. And these need to be taken into account when gauging the direction of monetary policy.

- **Risk management.** Central banks may want to deviate from the Taylor rule if there is an asymmetric balance of risks around the outlook. This is especially relevant at the lower nominal bound. Risk management is a good reason why the Bank of England is comfortable delaying its first rate hike and move slowly thereafter, in our view.

- **Headwinds and tailwinds.** There may be forces influencing growth in the economy, which are not integral to the Taylor rule, which the central bank needs to lean against. Actual macro outturns reflect the net effect of monetary policy and other forces influencing growth. Over recent years, fiscal austerity and deleveraging in the private sector have been headwinds weighing on growth in the Euro area and the UK, which would justify an easier stance than the Taylor rule would suggest. The Euro area crisis has been a headwind for other economies in the region, which has also influenced central bank behavior.

- **Impairment of the transmission mechanism.** The Taylor rule implicitly assumes that the monetary stance is effectively transmitted to the real economy and that the policy rate is a good indicator of the stance. This has not been the case over recent years, as intermediation spreads have widened. Leaning against this will result in a policy stance that looks easier than the Taylor rule would suggest.

- **Low inflation expectations.** Behind the Taylor rule is a model that assumes inflation expectations are stable close to the central bank's objective. To the extent that inflation expectations have fallen, this would warrant an easier policy stance than the Taylor rule would suggest. This looks to us to be an issue in the Euro area and Sweden.

- **Extra slack beyond measured unemployment.** Our Taylor rule analysis uses unemployment as the measure of slack in the economy. There is a debate about extra slack coming from discouraged workers and part-timers who can be absorbed over time. To the extent that there is extra slack, this would warrant an easier policy stance than the Taylor rule would suggest. Uncertainty about the slope of the Phillips curve also is important. To the extent that the Phillips curve is flatter than in the past—which means less inflation for any given degree of labor market tightness—then policy should be easier than the Taylor rule suggests.

- **The currency.** The exchange rate is not a direct input into the Taylor rule. To the extent that the exchange rate is moving significantly, this is a reason for a policy stance different to the Taylor rule. In Western Europe, this is a particular issue for smaller countries as the ECB implements sovereign QE. Strong currency appreciation against the euro warrants an easier policy stance than the Taylor rule would suggest. Thus far, this has been a real issue for the Bank of England, the SNB and the DNB, but not for the Riksbank. The appreciation of the Norwegian currency has been modest. Nevertheless, the Riksbank and the Norges Bank are fearful of future currency appreciation.

- **Financial stability.** The need to ensure financial stability may be considered a reason for policy to diverge from the Taylor rule. Central banks differ in their views about this but increasingly macroprudential policy is viewed as the appropriate instrument to deal with financial stability risks. As we saw with the Riksbank last year, a central bank using monetary policy to manage financial stability risks can come under severe criticism in a deflationary environment.

- **Idiosyncratic vulnerabilities.** There are occasions when an economy is sensitive to a shock in a way that is different to the model underlying the Taylor rule, which warrants a different response. The sensitivity of the Norwegian economy to an oil price decline is an example of this.

While these are all legitimate reasons for being away from the Taylor rule, central banks have little confidence in quantifying their effects. For those central banks still easing, except the Norges Bank, the move away from the Taylor rule is constrained by the lower nominal bound and concern about adverse consequences of significant balance sheet expansion. The ECB, in our view, should be doing a lot more balance sheet expansion, not only due to the message from the Taylor rule but also due to the need to manage downside risks, lean against deleveraging headwinds, overcome the impairment of the transmission mechanism and respond to declining inflation expectations. As far as the Bank of England is concerned, uncertainty about quantifying the reasons for being away from the Taylor rule has meant that it is currently motivated by contemporaneous developments in nominal magnitudes—wages, core inflation and inflation expectations—to a greater extent than it has been in the past. The Taylor rule delivers a balanced approach to deviations from equilibrium on both the real and nominal sides. At the moment, it seems as if the nominal side is getting a bit more weight. In a sense, the Bank of England has become a bit less forward looking, in our view.

In gauging what being away from the Taylor rule means for the macro economy, it is important to recognize that the Taylor rule is about achieving macroeconomic balance—full employment and price stability—over a reasonable horizon. It does not directly map into any particular growth trajectory. Thus, an economy can still grow if monetary policy is too tight relative to the Taylor rule, but it will not grow by enough to achieve full employment and price stability over a reasonable horizon.

The menu of policy instruments

In response to a variety of pressures as captured by the Taylor rule and beyond, central banks in Western Europe have been using a wide variety of instruments to manage demand and inflation: forward guidance, negative policy rates, low-cost loans to banks, asset purchases (domestic and foreign) and macroprudential policy.

For the Bank of England, as it looks towards normalization, its options include forward guidance, lifting the policy rate, ending the reinvestment of maturing assets, asset sales and macroprudential policy. Our judgment is that the policy normalization will begin with a focus on lifting the policy rate and only after a significant increase has been achieved, will the Bank of England halt reinvestments and then eventually start to sell assets. Throughout this, the Bank of England's guidance is likely to emphasize a gradual move up in rates to a lower level than would have been considered normal in the past.

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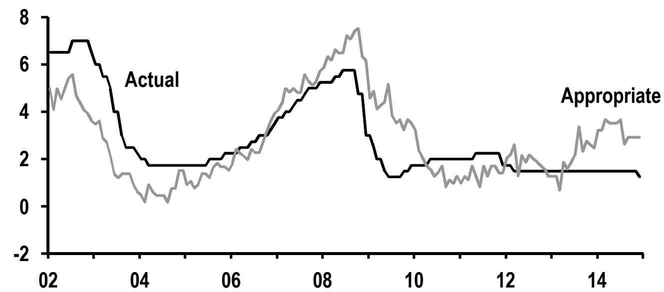
For all of the other central banks in Western Europe—all of whom have a bias to ease further—this full menu of instruments can be used to promote movement towards macroeconomic balance. For the ECB, asset purchases and low-cost loans to banks are the preferred instruments. For other central banks in the region, the preferred instrument at the moment is the policy rate, which is moving deeper into negative territory (except in Norway). While there is a clear limit to how negative the policy rate can get, central banks may continue to push rates lower if needed. As we have also seen recently with the Riksbank and DNB, forward guidance and balance sheet expansion are also instruments to be used as needed.

Actual and appropriate Norwegian policy rate using a Taylor rule

%, using core inflation (CPI-ATE)



Source: Statistics Norway, Labor Directorate, J.P. Morgan

The Norges Bank

Of the Western European central banks, the Norges Bank faces the most pressure to tighten, according to the Taylor rule. Back in 2012, the Norges Bank policy rate was broadly aligned with the Taylor rule. Since then, the Taylor rule assessment of the appropriate policy rate in Norway has risen, while the actual policy rate remained unchanged until December last year when the Norges Bank cut 25bp. The gap between the actual policy rate and the Taylor rule is now 170bp.

Understanding the forecast for the Norges Bank using a Taylor rule with core CPI

%, using CPI-ATE inflation

	Neutral nominal policy rate	Unemployment rate	Core CPI	Taylor rule rate	Forecast of policy rate	Gap (%-pts)
4Q14	3.75	3.7	2.4	3.0	1.42	-1.6
4Q15	3.75	3.9	2.7	3.1	1.00	-2.1
4Q16	3.75	3.8	2.6	3.1	1.25	-1.9

Source: Statistics Norway, Labor Directorate, J.P. Morgan estimates

At first blush, this would suggest that the Norges Bank should be tightening policy. However, given its role as a major oil producer, the Norwegian economy is adversely affected by the collapse in oil prices. Our analysis suggests that a 10%-pt drop in oil prices leads to a 19bp reduction in mainland GDP growth in the first year, and an additional 12bp fall in the second year. Given that oil prices in krone terms have declined by around 30% since last summer, GDP growth could be reduced by 0.6%-pt this year and 0.4%-pt next year. This is close to the revisions that the Norges Bank made to its growth forecasts for 2015 and 2016 in the December monetary policy report. All else equal, to offset a 1%-pt negative shock to demand, the central bank would need to ease monetary policy by around 100bp.

The Norges Bank has begun to respond to this shock with a 25bp rate cut in December, and we expect a further 25bp rate cut in March. With the level of the policy rate still at 1.25%, there is plenty of room for further rate cuts. There is also room to ease fiscal policy. All else equal, to offset a 1%-pt shock to demand, fiscal policy would need to ease by 1%-pt of GDP. According to the fiscal rule, fiscal policy can be eased by around 2%-pts of GDP.

Over time, as the impact of the oil price shock fades, the Taylor rule points to the need for some rate adjustment in Norway. In our view, the Norges Bank will be slow to react to this pressure, due to concern about the impact of persistently easy money in the Euro area on the Norwegian currency. Nevertheless, we do expect a rate hike towards the end of 2016.

The Bank of England

The Taylor rule suggests that the appropriate policy rate in the UK is currently around 1.3%, compared to the actual policy rate of 0.5%. With growth solid and the unemployment rate falling rapidly it is not surprising that the Bank of England is approaching the beginning of normalization, even though inflation still remains well below the target.

One important issue to deal with in the UK is the contribution to policy easing by QE. Balance sheet expansion is an attempt to mimic a negative policy rate. If we use the Bank of England analysis to convert balance sheet expansion into a policy rate equivalent, then this might suggest an effective policy rate of almost -4% currently (see "How will the BoE respond to low inflation," *GDW*, Jan 23, 2015). However, the impact of QE decisions may decline as dislocation in financial markets fades. We have tried to take account of this by weighting the stock of QE by a proxy for financial conditions—wholesale bank funding costs. This means that the improvement in funding conditions since 2012

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has reduced the impact of QE. Even so, this technique would still mean that the effective policy rate is currently -0.3%, implying a gap of 160bps relative to the Taylor rule estimate of the appropriate policy rate.

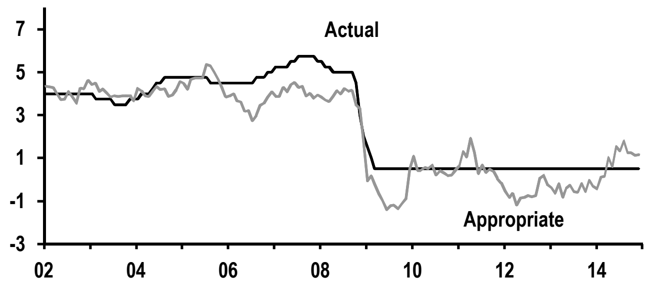
But, it is clear that the Bank of England is comfortable maintaining a policy stance below the Taylor rule, due to the need to manage asymmetric risks, the persistence of headwinds, concern about inflation expectations and the existence of additional slack beyond measured unemployment. This means that normalization will start later, and move more gradually, than the Taylor rule would suggest is appropriate.

At the moment, the Bank of England is especially sensitive to very low headline inflation, with concern that it will feed through to wages, core inflation and inflation expectations. We expect these concerns to gradually fade in the coming months as oil prices stabilize and then rise. This means that the case for starting normalization will strengthen, especially as the rapidly tightening labor market has clearly set the scene for higher wage growth. Our forecast anticipates a 25bp rate hike in the fourth quarter. The late start of normalization means that the gap between the Taylor rule estimate of the appropriate policy rate and the actual policy rate will rise from 90bps at the end of last year to 190bps at the end of this year.

This gap between the actual policy rate and the Taylor rule is increasing because we do not expect the Bank of England to match the increases in the appropriate rate suggested by the Taylor rule. After increasing this year, the gap remains relatively steady at 190bps through next year. This gap can be justified by the same arguments used at the moment to explain a relatively late start to normalization, although it seems likely that most of the current reasons to be off the Taylor rule will diminish in importance over time. However, there is one additional headwind to add to the list. Although deleveraging headwinds have faded over the past couple of years, a new headwind from elevated debt may emerge as interest rates rise. Elevated debt reduced the traction of monetary policy during the easing and elevated debt may increase the traction of monetary policy during the tightening. This means that the economy will be affected more by monetary policy tightening than in the past.

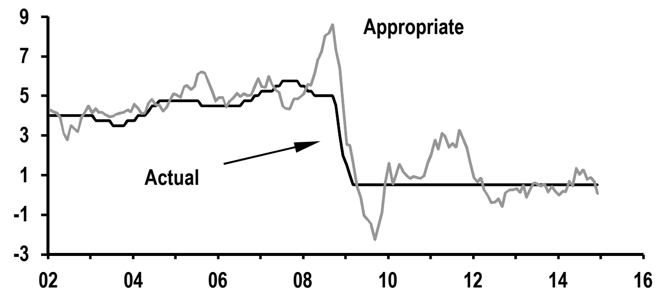
One important issue going forward is the outlook for the supply side, which has the ability to put more pressure on the Bank of England than currently anticipated. Since the beginning of 2013, GDP growth in the UK has averaged 2.5%, while the unemployment rate has declined at an annualized pace of around 1%-pt. In both our forecast and the Bank of England's forecast, the pace of decline in unemployment slows in the coming couple of years,

Actual and appropriate UK policy rate using a Taylor rule
%, using core CPI



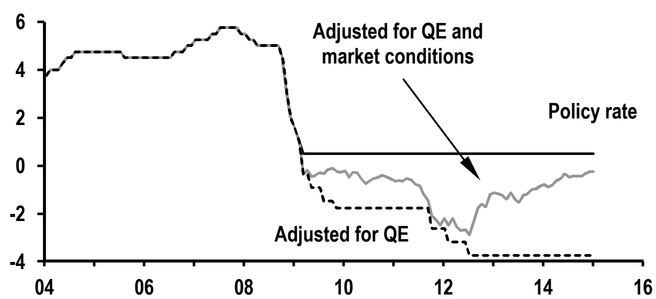
Source: BoE, ONS, J.P. Morgan

Actual and appropriate UK policy rate using a Taylor rule
%, using headline CPI



Source: BoE, ONS, J.P. Morgan

Adjusting the BoE policy rate for QE
%



Source: BoE, J.P. Morgan

Understanding the forecast for the BoE using a Taylor rule with core CPI
%

	Neutral nominal policy rate	Unemployment rate	Core CPI	Taylor rule rate	Forecast of policy rate	Gap (%-pts)
4Q14	3.3	5.7	1.3	1.4	0.50	-0.9
4Q15	3.3	5.1	1.5	2.6	0.75	-1.9
4Q16	3.3	4.9	1.8	3.3	1.50	-1.8

Source: ONS, BoE, J.P. Morgan estimates

compared to the past two years, even though growth is expected to be slightly stronger. This slowdown in the pace of decline in unemployment reflects an anticipated pickup in productivity and labor force participation. If this supply side improvement fails to materialize, the unemployment rate will keep falling sharply. By the end of 2016, it could be close to 4%. An unemployment rate of 4% at the end of 2016, along with core inflation at 1.8%, would put the appropriate policy rate according to the Taylor rule at 4.7%, 140bps higher than in the baseline forecast.

In the early stages, tightening will focus on the policy rate, and the Bank of England will maintain a steady balance sheet by continuing to reinvest maturing assets. We expect this reinvestment policy to continue until three to six months after normalization begins. We continue to believe that there will be actual asset sales as well, starting around twelve to eighteen months after the first rate hike. At the moment, we are expecting sales of less than £5bn a month. All of these moves can be slowed down or speeded up depending on macroeconomic developments. Throughout this, the Bank of England's forward guidance will stress a gradual adjustment to a level of rates that will be lower than was considered normal in the past.

The Swiss National Bank

According to our analysis, the SNB's policy stance is currently a bit too loose relative to the Taylor rule, but this gap will close as the economy adjusts to the recent currency appreciation.

Over the past three years, the SNB has not been setting policy on the basis of domestic macroeconomic conditions. In September 2011, the SNB announced that it would purchase foreign currency assets to an unlimited extent in order to hold the EUR/CHF exchange rate at a level no lower than CHF1.20. The SNB's ability to comfortably sustain a currency peg against the euro depends on the extent to which the business cycle in Switzerland aligns with that of the Euro area, and the ability of the SNB to match the ECB's policy stance.

During the global financial crisis, the business cycle in Switzerland was similar to the Euro area, as can be seen from the alignment in their respective Taylor rules. The Swiss franc nevertheless appreciated during this period suggesting that there were other forces at work. From early 2012, cyclical conditions began to diverge. The appropriate policy rate in Switzerland moved up from -164bps in early 2012 to close to zero at the end of last year. While Switzerland was in deflation during this period, the pace of deflation moderated.

Understanding the forecast for the BoE using a Taylor rule with headline CPI

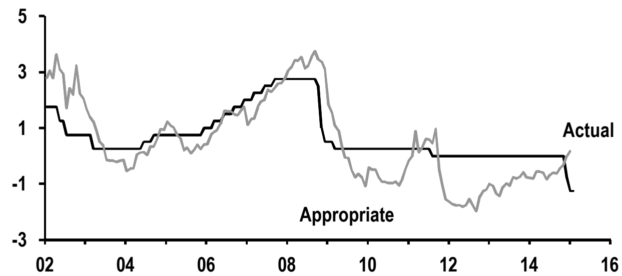
%

	Neutral nominal policy rate	Unemployment rate	Headline CPI	Taylor rule rate	Forecast of policy rate	Gap (%-pts)
4Q14	3.3	5.7	0.9	0.6	0.50	-0.1
4Q15	3.3	5.1	0.9	1.7	0.75	-1.0
4Q16	3.3	4.9	1.8	3.3	1.50	-1.8

Source: ONS, BoE, J.P. Morgan estimates

Actual and appropriate Swiss policy rate using a Taylor rule

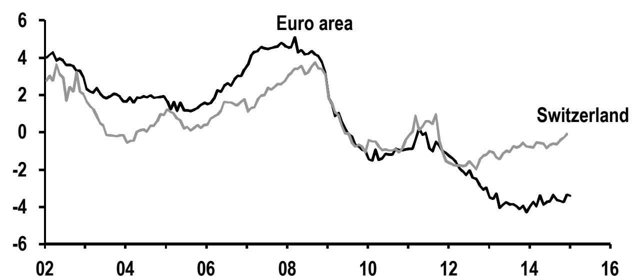
%, using CPI ex. food, beverages, tobacco and energy



Source: SNB, SFSO, J.P. Morgan

Taylor rules for the Euro area and Switzerland

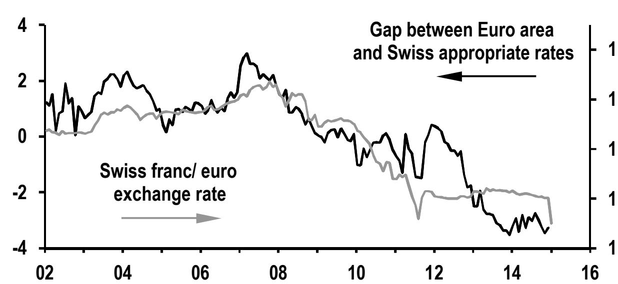
%, using core inflation



Source: Eurostat, SNB, SFSO, J.P. Morgan

Appropriate policy rates and the exchange rate

%-pts CHF/Euro



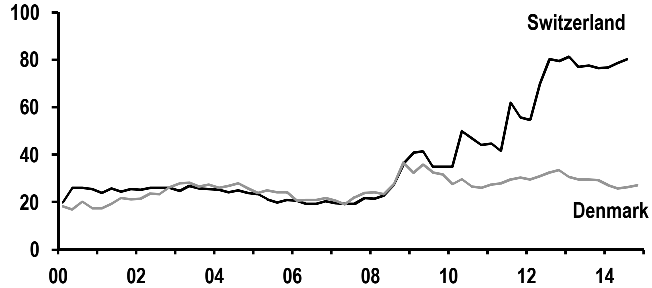
Source: Eurostat, SNB, SFSO, J.P. Morgan

For core inflation, which is what is used in the Taylor rule, the year on year change in inflation moved from -1.2% in early 2012 to 0.3% at the end of last year. Swiss unemployment remained relatively steady at close to the natural rate of unemployment. Meanwhile, the Taylor rule estimate of the appropriate policy rate in the Euro area fell from -128bps in early 2012 to -375bps towards the end of last year, as unemployment rose and core inflation fell.

Perhaps unsurprisingly, this macro divergence, alongside other forces, put upward pressure on the Swiss currency, which the SNB resisted by foreign exchange intervention. The intervention proved to be very large, moving the SNB's balance sheet up to 80% of GDP by the end of last year. The pressure on the currency got greater as the ECB moved towards a more dramatic policy easing. Given the potential costs associated with such a large stock of foreign currency denominated assets, and the constraints on matching the ECB's policy stance domestically, the SNB abandoned the currency peg in January this year. The currency immediately shot up and the SNB cut the target range for the 3-month Swiss franc Libor rate to -0.25 to -1.25%.

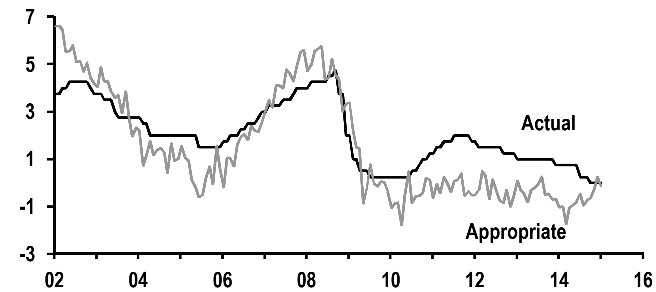
Further pressure on the SNB could come from a number of directions. Now that the peg has been abandoned, the central bank returns to being a flexible inflation targeter, albeit one with a still-significant focus on the currency. At first blush, it appears that the currency has now adjusted to relative cyclical conditions with the Euro area, so fundamental pressure from here should be limited. There may of course be other pressures on the currency. Aside from the currency, inflation expectations and the macro outlook will be important. Given that inflation has been very subdued for a long time, it seems likely that inflation expectations have slipped somewhat. This decline would warrant an easier policy stance than the Taylor rule would suggest, in our view. Also, the macroeconomic consequences of abandoning the peg need to be considered. The close to 10% appreciation of the trade weighted exchange rate over the past year will weigh on growth and inflation, lowering the appropriate policy rate.

Central bank balance sheets
% of GDP



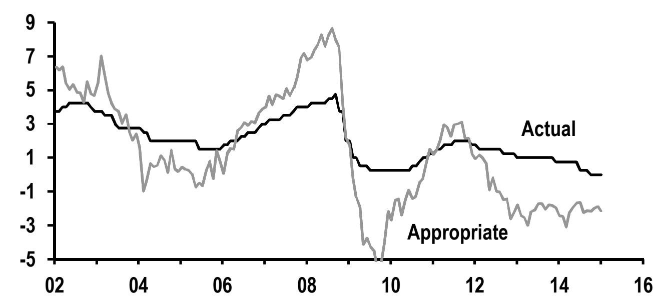
Source: SNB, Danish National Bank, Danmarks Statistik, SECO

Actual and appropriate Swedish policy rate using a Taylor rule
%, using core inflation (CPIF ex. energy)



Source: Eurostat, SCB, Riksbank, J.P. Morgan

Actual and appropriate Swedish policy rate using a Taylor rule
%, using headline CPI



Source: Eurostat, SCB, Riksbank, J.P. Morgan

The Riksbank

Since 2010, monetary policy in Sweden has been almost 150bp tighter than the Taylor rule as the Riksbank has leant against financial stability risks coming from strong credit growth. One consequence of this has been a persistent undershoot on inflation. Since 2012, headline inflation has averaged 0.2% while core inflation (CPIF ex. energy) has averaged 1%, both well below the Riksbank's target.

The gap between the Taylor rule and the policy stance has narrowed recently, as the labor market has continued to tighten and as the Riksbank has eased further, following the shift in the focus of monetary policy last summer. The gap between the policy stance and where it should be according to the Taylor rule is now close to zero. At first blush, this might suggest that the Riksbank is not under any particular pressure to ease further. However, there are two reasons why the bias to ease in Sweden will remain in place. First, inflation expectations have fallen and are now below the level consistent with the Riksbank's inflation objective. And second, the policy shift in the Euro area risks putting upward pressure on the Swedish krona. This has not happened yet, but remains a cause for concern.

The Riksbank has responded to both of these developments by easing further. Last October, the Riksbank cut the policy rate by 25bps to zero and delayed the timing of the first hike in its projections from late 2015 to mid-2016. In February, the Riksbank eased further by cutting the policy rate to minus 0.1%, adjusting the projected repo path downward and announcing asset purchases of SEK10bn of government bonds. In addition, the central bank expressed an expectation that the policy rate would remain at -0.1% until CPIF inflation is close to 2%. It also stated that it is prepared to do more in order to ensure that inflation returns to the 2% objective. All options are on the table for further easing—pushing the policy rate further into negative territory, delaying the timing of tightening in the projections, further asset purchases and low cost loans to banks.

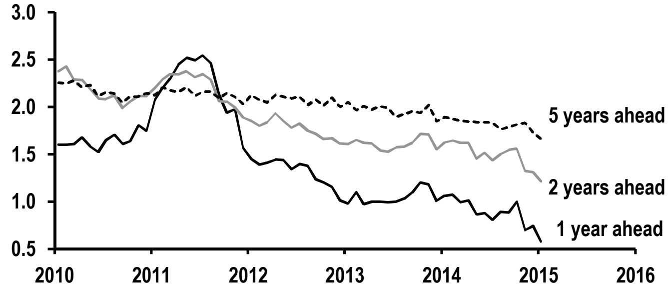
Clearly the Riksbank is very concerned about how external developments—lower oil prices, monetary easing in the Euro area and the situation in Greece—could weigh down core inflation and inflation expectations further. The role of low oil prices depressing headline inflation appears to be of particular importance. One way to illustrate this is to look at the Taylor rule using headline inflation rather than core inflation. A Taylor rule using headline inflation suggests that the appropriate policy rate in Sweden is currently -220bps, much lower than the Taylor rule using core inflation. This suggests that as long as headline inflation remains unusually low, the Riksbank will continue to have a bias to ease, and will respond quickly to downside inflation surprises. Another way to calibrate the impact of subdued inflation expectations is to assume that there has to be a temporary overshoot of the inflation objective in order to lift inflation expectations. In our Taylor rule, an objective of lifting inflation a full percentage point above the target would warrant a further 150bp of monetary easing.

Despite a bias to ease, we do not expect the Riksbank to move again in the coming months. The recent bounce in oil prices and the decline in the currency over the past year suggest that near-term downside risks to inflation are fairly limited. Nevertheless, a downside inflation surprise or a further decline in inflation expectations would prompt a policy ease. Also important is the currency. The Riksbank expects the currency to appreciate in the coming months. If it were to rise more than anticipated, that could trigger further easing.

Looking beyond the next few months, we do see pressure for more easing. During the second half of the year, the Riksbank anticipates a rapid rise in inflation, which it expects to continue in 2016. We do not think inflation will rise in this manner, due to subdued inflation expectations, and we anticipate that the level will get stuck well below the Riksbank's objective. Thus, while we see little reason for the Riksbank to move in the next few months, we do anticipate further easing later in the year. For now, we anticipate further easing at the October meeting, comprising another 10bps

Sweden: Prospera inflation expectations survey

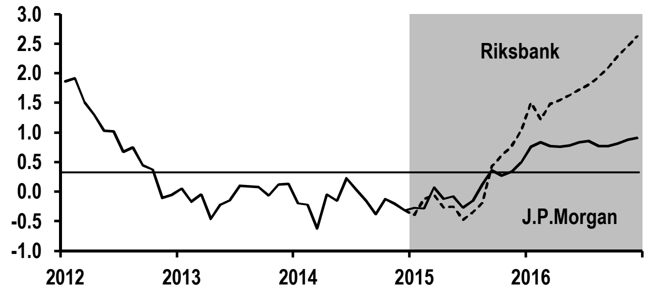
%oya



Source: TNS, SIFO

Swedish CPI inflation

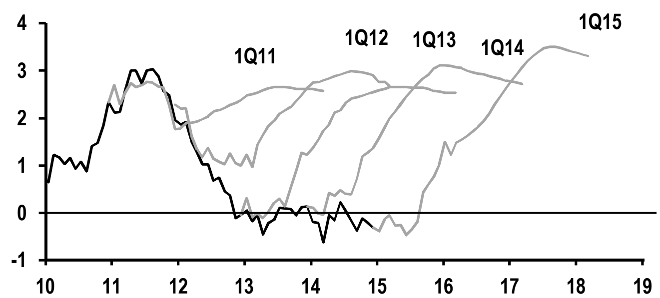
%oya, shaded region denotes forecast



Source: SNB, Riksbank, and J.P.Morgan

Swedish inflation and Riksbank inflation forecast

%oya



Source: SCB and Riksbank

Understanding the forecast for the Riksbank using a Taylor rule with core CPI

%, using CPIF ex. Energy

	Neutral nominal policy rate	Unemployment rate	Core CPI	Taylor rule rate	Forecast of policy rate	Gap (%-pts)
4Q14	2.5	7.8	1.0	-0.2	0.1	0.3
4Q15	2.5	7.5	1.4	0.9	-0.2	-1.1
4Q16	2.5	7.2	1.5	1.5	-0.2	-1.7

Source: Eurostat, SCB, Riksbank, J.P. Morgan estimates reduction in the policy rate, a further delay in the timing of the first hike, and an additional SEK10bn in government bond purchases.

This pressure to ease further in the second half of the year is not evident in the Taylor rule, where our macro forecast suggests that over time the appropriate policy rate suggested by the Taylor rule will rise. In our view, the Riksbank will not respond to this pressure, given subdued inflation expectations and persistently easy monetary policy in the Euro area. Our expectation is that the policy rate in Sweden will not increase until the middle of 2017.

The Danish Nationalbank

For some time, the Danish Nationalbank's policy stance has been a long way from the Taylor rule, essentially because it has been matching the ECB's policy stance with similar macro economic conditions. The DNB maintains a currency peg to the euro within ERM2 (7.46038 +/- 2.25%). From a macroeconomic perspective, the peg is sustainable to the extent that the business cycle in Denmark aligns with that of the Euro area and the DNB matches the ECB's policy stance. This has been the case for a while, as is evident in the similarity of the Taylor rule estimates of the appropriate policy rate. During the past two years, the appropriate policy rate in the Euro area has averaged around -375bps and in Denmark has averaged around -350bps, while actual policy rates have been relatively close.

During this period there was little upward pressure on the Danish currency as evidenced by the stability of FX reserves. This situation would have remained stable as long as the ECB failed to respond to the pressures captured by the Taylor rule. But, this began to change from the middle of last year when the ECB announced a program of balance sheet expansion involving low-cost loans to banks and private sector asset purchases. However, there were doubts about exactly how much stimulus the ECB program would provide, so the pressure on the Danish krone was very limited. This changed in January with the ECB's announcement of an extended, open-ended asset purchase program including sovereign bonds.

The dramatic shift in Euro area monetary policy at the beginning of this year put upward pressure on the Danish currency. Additional speculative pressure came after the SNB abandoned its euro peg on January 15th. The Danish central bank has responded to this pressure partly by increasing foreign exchange intervention and partly by mimicking the ECB's easing by driving the interest rate on excess reserves (the certificates of deposit rate) into negative territory and by suspending the issuance of government bonds to limit the supply of sovereign debt. The impact on government bond yields has been striking: five-year yields in Denmark are now well below comparable German yields.

Understanding the forecast for the Riksbank using a Taylor rule with headline CPI

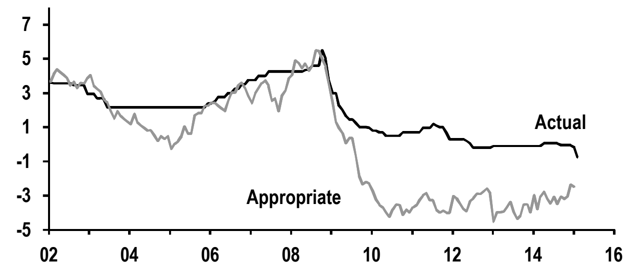
%

	Neutral nominal policy rate	Unemployment rate	Headline CPI	Taylor rule rate	Forecast of policy rate	Gap (%-pts)
4Q14	2.5	7.8	-0.2	-2.0	0.1	2.1
4Q15	2.5	7.5	0.4	-0.7	-0.2	0.5
4Q16	2.5	7.2	0.8	0.4	-0.2	-0.6

Source: Eurostat, SCB, Riksbank, J.P. Morgan estimates

Actual and appropriate Danish policy rate using a Taylor rule

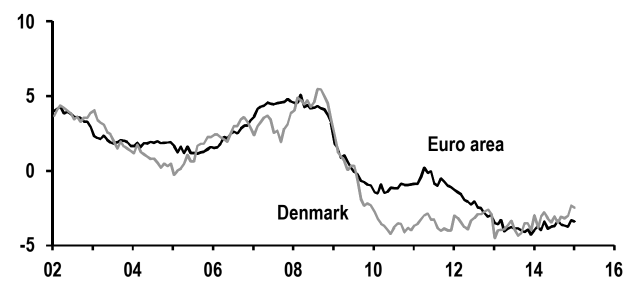
%, using core HICP



Source: Eurostat, DNB, J.P. Morgan

Taylor rules for the Euro area and Denmark

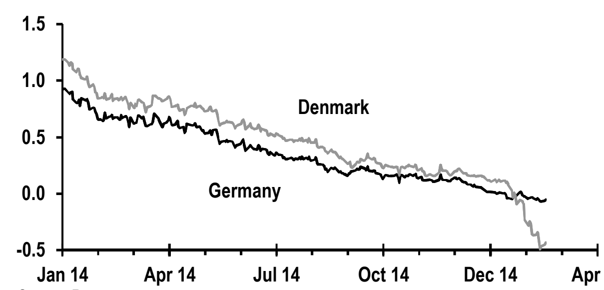
%, using core HICP



Source: Eurostat, J.P. Morgan

5yr government bond yields

%



Source: Reuters

Whether these steps are enough to stabilize the currency remains to be seen. There seems little doubt that the Danish central bank is fully committed to the currency peg, and it can continue to take measures to limit appreciation—a further exploration of the true lower nominal bound for the policy rate, further FX intervention and even domestic QE. Also one benefit of being in the ERM is that the ECB can also intervene to limit the krone appreciation if the currency moves to the extreme of the band at 7.29252, although such intervention is constrained by the ECB's holdings of Danish currency. Nevertheless, speculation has continued about whether there will be a regime shift in Denmark, as there was in Switzerland.

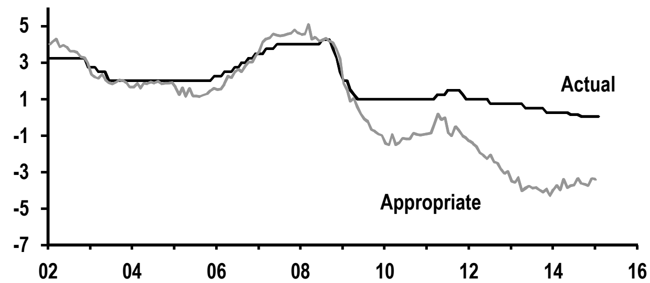
Generally, currency pegs come under pressure because there is some cost to sustaining the peg, either in macroeconomic performance or in terms of risk to the central bank's balance sheet. In our view, there is little macroeconomic cost from the Danish central bank pushing interest rates lower and purchasing domestic assets. There is still plenty of slack in the labor market and inflation is very low. Admittedly, credit and housing conditions are more buoyant in Denmark than in the Euro area, but not to an extent that could not be managed by macroprudential measures. Gauging the costs from heavy accumulation of foreign assets on the central bank's balance sheet is hard. There is a certain circularity in the process: the greater the upward pressure on the currency, the greater the risk from the balance sheet expansion, the greater the threat to the currency peg, and so on. But, our judgment is that the central bank will be very tolerant of the potential costs arising from the accumulation of foreign currency assets on its balance sheet, given the central role that the exchange rate peg has played in macro policy for several decades. Given the lower nominal bound on the policy rate, there is a limit on how much interest rate differentials can be used to deter speculation. Nevertheless, it seems likely that the DNB has enough scope to resist speculative pressure for an extended period, although, at the moment, that pressure looks pretty intense. Since December, FX intervention appears to have amounted to around 12% of GDP.

The European Central Bank

According to the Taylor rule, the appropriate policy rate in the Euro area—the policy rate that delivers macroeconomic balance over a reasonable horizon—is currently around minus 350bps. This has been evident for a while, with the clear implication that the ECB has been facing a choice: either shift towards very significant balance sheet expansion or allow the region to get stuck in a low growth/low inflation rut. This choice became increasingly evident to the ECB over the course of last year and the central bank put in place measures to expand its balance sheet: low-cost loans to banks

Actual and appropriate Euro area policy rate using a Taylor rule

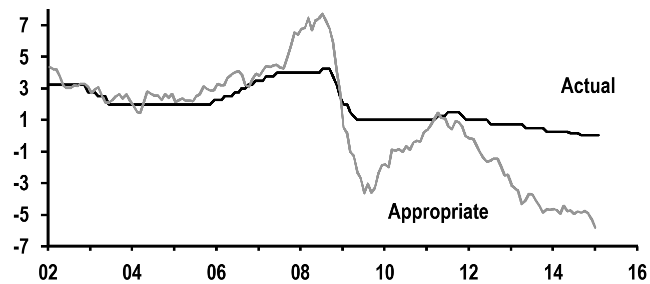
%, using core HICP



Source: Eurostat, ECB, J.P. Morgan

Actual and appropriate Euro area policy rate using a Taylor rule

%, using headline HICP



Source: Eurostat, ECB, J.P. Morgan

and purchases of private sector assets. In addition, the ECB cut policy rates with the deposit facility rate—which determines the remuneration of excess reserves—reduced to -20bp. Negative remuneration on excess reserves, in an environment where there are significant excess reserves, not only pushes rates lower along the yield curve but also encourages a greater velocity of circulation of reserves, amplifying the impact of balance sheet expansion.

Towards the end of last year, it became apparent that the ECB needed to do more. The first two TLTRO auctions disappointed and, the universe of marketable private sector assets, just wasn't very large. Thus, early this year the ECB announced an expanded asset purchase program to include sovereign bonds.

A reasonable question to ask is how much balance sheet expansion would be required to deliver macroeconomic balance in the Euro area over a reasonable horizon. Academic studies, such as the one published by the Bank of England in 2011 can help to answer that question (see "The United Kingdom's quantitative easing policy: design, operation and impact," *BoE quarterly bulletin 3Q11*, Sep 19, 2011). According to that study, a central bank wanting to mimic a 350bp monetary easing using asset purchases as the instrument would need to expand its balance sheet by around

20% of GDP. Interestingly, the same answer comes from considering developments in the US and UK. Both the Federal Reserve and the Bank of England are seeing movement back towards their macroeconomic objectives and are both contemplating interest rate increases. In contrast, the ECB has seen movement away from its macroeconomic objectives. One key difference is the extent of central bank balance sheet expansion. In both the US and the UK, central bank balance sheet expansion has amounted to around 20% of GDP. An expansion of this magnitude in the Euro area is equivalent to €2tn.

A €2tn expansion area would lift the ECB's balance sheet from €2tn to €4tn. This may be more than the ECB has in mind at the moment. Taking account of all of the instruments being used, and the maturing LTROs from 2012, we anticipate an increase in the ECB's balance sheet to around €3.25tn in September 2016. Our judgment is that asset purchases will need to continue beyond that figure to ensure that the region moves back to macroeconomic balance.

Thus far we have considered how the ECB might seek to close the gap between its policy stance and where the Taylor rule suggests it should be. However, there are a number of reasons why the ECB should have a policy stance that is easier than the Taylor rule suggests, including persistent headwinds from deleveraging, ongoing impairment of the monetary transmission mechanism, declining inflation expectations and labor slack beyond the pool of unemployed. All of this adds to the impression that asset purchases will need to continue beyond September 2016.

Looking at our macroeconomic projections over the next couple of years, the gap between the policy rate and the Taylor rule starts to narrow as the ECB's balance sheet expansion lifts growth and reduces unemployment. But, it is important to stress that the overall policy stance remains tighter than it should be throughout the forecast horizon, increasing the likelihood that inflation remains well below the ECB's objective for a very extended period, as inflation expectations decline to a level well below 2%. The pressure on the ECB to do more is not going to go away. In terms of what doing more looks like, our judgment is that the ECB would increase asset purchases. However, pushing the deposit rate further into negative territory also is a possibility.

BoE estimated effect of QE

%, unless stated, based on QE1

	Est. effect	Implied effect of increments			
Purchases (£bn)	200	100	50	25	1
Gilt yields (bps)	-100	-50	-25	-12.5	-0.5
GDP level	1.75	0.88	0.44	0.22	0.01
Inflation at peak	1.13	0.56	0.28	0.14	0.01
Rate equiv. (bps)	-225	-113	-56	-28	-1

The estimated effect is taken from a BoE article on QE in the 3Q 2011 quarterly bulletin. The article expresses the macro effect of QE as a range based on several different studies. £200bn of asset purchases amount to 14% of GDP. So asset purchases of 1% of GDP yield 16 basis points in rates space.

Source: BoE, J.P. Morgan

Understanding the forecast for the ECB using a Taylor rule with core CPI

%

	Neutral nominal policy rate	Unemployment rate	Core CPI	Taylor rule rate	Forecast of policy rate	Gap (%-pts)
4Q14	2.0	11.4	0.7	-3.6	0.05	3.7
4Q15	2.0	10.6	0.8	-2.2	0.05	2.3
4Q16	2.0	9.8	1.1	-0.6	0.05	0.7

Source: Eurostat, ECB, J.P. Morgan estimates

Understanding the forecast for the ECB using a Taylor rule with headline CPI

%

	Neutral nominal policy rate	Unemployment rate	Headline CPI	Taylor rule rate	Forecast of policy rate	Gap (%-pts)
4Q14	2.0	11.4	0.2	-4.3	0.05	4.4
4Q15	2.0	10.6	0.4	-2.8	0.05	2.9
4Q16	2.0	9.8	1.0	-0.7	0.05	0.8

Source: Eurostat, ECB, J.P. Morgan estimates

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