

Interest rate pass-through since the financial crisis¹

Policy rates in advanced economies are at record lows and central banks have resorted to unconventional policy tools, but there are concerns that the low policy rates have not been transmitted to lending rates for households and non-financial firms. In this special feature, we investigate whether the pass-through of monetary policy to rates on bank loans to non-financial firms has been impaired in the aftermath of the Great Recession. Our results suggest that the difference between lending rates to the non-financial corporate sector and policy rates is currently close to the pre-crisis level in the United States and Germany, but remains higher in peripheral euro area countries.

JEL classification: E43, E52, C32.

Over the past few years, monetary policy in advanced economies has been exceptionally accommodative. Policy rates have been near zero for an unprecedented length of time. In addition, major central banks have taken non-standard monetary policy actions to encourage banks to lend, with the ultimate goal of providing economic stimulus. By doing so, policymakers have tried to directly influence interest rates in specific segments of the debt market.

While central bank interventions have largely succeeded in keeping interest rates on government bonds low (Meaning and Zhu (2011)), there have been doubts about their ability to effectively stimulate borrowing by households and non-financial firms. Lending rates have indeed declined since the onset of the Great Recession, but has the pass-through of monetary policy to bank lending rates been as strong as in the past?

This special feature empirically investigates the response of lending rates to monetary policy rates in major advanced economies, and assesses whether and to what extent such response has changed since the onset of the Great Recession. In a nutshell, our results suggest that the pass-through of monetary policy has not worked as in the pre-crisis period, and that borrowers have benefited from low policy rates only to a limited extent, especially in euro area peripheral countries.

The article is structured as follows: first, we describe the channels through which monetary policy transmits to lending rates and present evidence on the

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evolution of the lending spread since the onset of the Great Recession. We then investigate the factors driving lending rates by decomposing the “lending spread” into different components. Finally, we relate the most important of such components to credit risk.

The transmission of monetary policy via interest rates

Over the last few decades, setting policy rates has been viewed as the standard tool of monetary policy. The implementation of the monetary policy stance via open market operations ensures that policy rates transmit to the interest rates at which financial institutions refinance themselves. In turn, competition in lending and funding markets should ensure that changes in the policy stance are also passed on to other interest rates. A reduction in the policy rate is thus expected to translate into a decline in lending rates for firms and households, which should stimulate consumption and investment. This is the interest rate channel of monetary policy transmission, which is the main focus of this special feature.

The transmission of policy rates to lending (and deposit) rates – the interest rate pass-through – is, however, far from mechanical and is affected by various factors. For instance, financial intermediaries may require a higher compensation for risk due to slowing economic activity. In this case, a reduction in the policy rate would only partially be passed on to firms or households. Conversely, low perceived risk can magnify the pass-through and lead to an overheating of the economy.

The empirical literature on the transmission of monetary policy is vast. Bernanke and Blinder (1992) investigate the response of credit aggregates to monetary policy shocks. Borio and Fritz (1995) and Cottarelli and Kourelis (1994) focus more specifically on the pass-through of policy rates to lending rates, which we also focus on in this special feature. Studies on the heterogeneity in the pass-through at the individual bank level are limited to a few country studies (Weth (2002), Gambacorta (2008)). The bulk of the empirical literature has resorted to cointegrated time series models (Engle and Granger (1987)) to account for co-movements of policy and lending rates (see de Bondt (2005) and references therein). A recent contribution (European Central Bank (2013)) focuses on major euro area countries, reporting evidence of heterogeneity between core and peripheral countries.

Lending spreads since the crisis

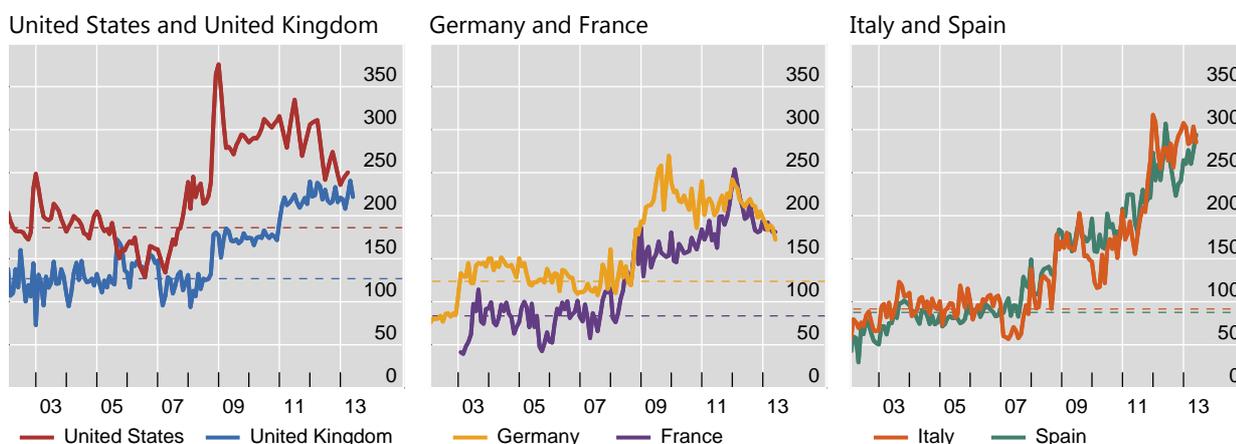
A first rough indicator of the effectiveness of the interest rate channel is the lending spread, ie the difference between lending and policy rates. In Graph 1 we plot the spread between lending rates and the overnight interbank rate,² together with a dashed line marking the pre-crisis (ie up to August 2008) average. Data are at monthly frequency and start in January 2002 for all countries except France (January

² Here, as is common in the empirical literature, we proxy monetary policy with the overnight interbank rate. This also serves the purpose of abstracting from strains in the interbank money market that may have played a role in the early moments of the crisis in particular. The role of the spread between the interbank and the policy rate is examined in the next section.

Spread between rates on loans to non-financial firms and the overnight interbank rate¹

In basis points

Graph 1



¹ For definitions of the lending rates, see Box 1. The overnight interbank rate corresponds to the effective federal funds rate for the United States, overnight GBP LIBOR for the United Kingdom and EONIA for the euro area countries. Dashed lines represent the pre-crisis average (January 2002–August 2008; for France, January 2003–August 2008).

Sources: Bank of England; ECB; Federal Reserve; Bloomberg; DataStream; BIS calculations.

2003);³ further details are reported in Box 1. After the onset of the Great Recession, spreads drifted away from their pre-crisis average in all countries, suggesting a change in the medium-run relationship between policy and lending rates. The issue is further discussed using a more formal statistical framework in Box 2.

In the United States, spreads surged in the aftermath of the Lehman Brothers bankruptcy, but narrowed thereafter. Over the past two years they trended down and are now approaching the pre-crisis average. In the United Kingdom, by contrast, spreads rose first after the Lehman bankruptcy, and then again with the emergence of the euro area sovereign debt crisis. The spread is currently about 100 basis points than in the pre-crisis period.

Results for the euro area differ substantially across countries. Spreads for France and Germany steadily trended down over the past year, bringing the lending rate close to its pre-crisis average. By contrast, Italian and Spanish firms saw their borrowing costs rise progressively in spite of the ECB's accommodative monetary policy stance. In Italy, spreads remained relatively subdued until 2010, possibly thanks to the limited exposure of Italian banks to the financial turbulence. However, they quickly surged thereafter, reflecting the sharp deterioration of the economic outlook. In Spain, the increase in spreads also intensified with the deepening of the recession in 2011. In May 2013, Spanish and Italian firms were thus facing borrowing rates around 200 basis points above the pre-crisis average.

³ Our sample choice is motivated by data availability: pre-2002 series for lending rates in euro area countries and in the United Kingdom are based on different definitions. Our sample therefore covers only one important recession. This is a serious shortcoming since lending rates appear to be stickier when policy rates go down than when they go up (Mojon (2000)). However, during the latest recession, spreads in the United States – where lending rates are available from the early 1990s – widened significantly more and for longer than during the 1990 and the 2001 recessions.

Data on interest rates

We collected data on interest rates for France, Germany, Italy, Spain, the United Kingdom and the United States. Coverage starts in January 2002 (except for Spain and France, for which it starts in April 2002 and January 2003, respectively) and ends in May 2013 for the United Kingdom and the euro area countries and in March 2013 for the United States. All rates are annualised.

The US policy rate is the federal funds target rate up to December 2008 and the midpoint of the target range thereafter. For the United Kingdom, we use the bank rate as published by the Bank of England. For the euro area, we use the main refinancing rate up to the introduction of fixed rate full allotment in October 2008 and the deposit facility rate thereafter (Beirne (2012)). The overnight interbank rate is the euro overnight index average (EONIA) for the euro area countries, the effective federal funds rate for the United States and overnight GBP Libor for the United Kingdom. The source for the secondary market one-year sovereign bond yield for the United Kingdom and the euro area countries is Bloomberg. The yield for the United States is obtained from the Federal Reserve, and is defined as the nominal constant maturity yield. Both sources provide daily data which are converted to monthly frequency by averaging daily observations.

Collecting lending rates was more challenging, since reporting practices differ across countries, and definitions are not homogeneous. We tried to use rates that match as closely as possible. For the euro area countries, we collected monthly data from the ECB that refer to the interest rate on loans over €1 million, other than revolving loans and overdrafts, convenience and extended credit card debt to non-financial firms for new businesses (see ECB (2003) for further details). The series starts in January 2003, and we used national central banks' data to backdate it further.^①

For the United States, data come from the Federal Reserve *Survey of Terms of Business Lending* for commercial and industrial loan rate spreads over the target federal funds rate, extended during the reporting period by loan size (see Brady et al (1998) for further details). The data are available only at quarterly frequency and were thus linearly interpolated so that we could perform the analysis using monthly data. We use the reported spread for commercial and industrial loans over \$1 million. Summing the reported spread over the target federal funds rate with the target rate itself gives us the effective loan rates in the United States.

For the United Kingdom, data are obtained from the Bank of England, which reports the monthly average across monetary and financial institutions of the weighted average interest rate on other loans and new advances between £1 million and £20 million to private non-financial firms (see Reynolds et al (2005) for further details). The series starts in January 2004, and we backdated it using the fixed lending rate on outstanding loans for non-financial firms.

Information on the maturity of the loans included in the basket is more scant. The United States reports the average maturity of the loans included in the basket, which was less than 1.5 years in May 2013. It also indicates that the average number of months after the last rate fixation was around 10. For the United Kingdom, Al-Dejaily et al (2012) state that over 90% of new loans had an original rate fixation period of less than one year. For the euro area, no explicit information on the maturity is available, but the original rate fixation is reported to be less than one year.

^① We did not backdate the data for France since the national source data shows a break when joined with the ECB data.

Decomposing the lending spread

The fact that lending spreads have increased does not constitute evidence that the pass-through has been impaired. Indeed, the lending spread is expected to vary over time as a function of the business cycle and other factors affecting the transmission mechanism. To gauge the nature of such factors, one can decompose

the lending spread into three components, each representing a different aspect of risk:

$$r_l - r_p = (r_l - r_g) + (r_g - r_b) + (r_b - r_p).$$

Starting from the right, the first component is the spread between the overnight interbank rate r_b and the policy rate r_p . Overnight interbank rates are often interpreted as target rates for monetary policy.⁴ Therefore, the two rates should normally be very close to each other, and misalignments signal strains in the interbank money market, including any credit or liquidity risk involved in lending to banks.

The second component is the spread between the yield of a one-year government bond r_g and the overnight interbank rate. Due to the mismatch in maturities, this element includes the term premium as well as a measure of the credit risk of the government relative to that of the banks. This spread should be negative if government bonds are considered to be free of credit risk and if the term premium is low.

Finally, the spread between the lending rate r_l and the government bond yield captures the credit risk on entrepreneurial activities and the willingness of the bank to take on this risk. Such a premium can indeed be expected to be higher in a downturn, and can be pushed up further by financial intermediaries' need to deleverage, ie improve their capitalisation ratio.⁵

In Graph 2, we report the evolution of these components for the United States, the United Kingdom, Germany, France, Italy and Spain. Since the onset of the Great Recession, the spread between lending rates and policy rates (the red line) has widened in all countries. Spreads have recently narrowed in the United States, Germany and, to a lesser extent, France, but have further increased in the United Kingdom, Italy and Spain. Strains in the interbank markets (green area) played a role in the aftermath of the Lehman bankruptcy and, for euro area countries, after the eruption of the sovereign debt crisis, but since then they have remained subdued in all countries.

Risk on government bonds (yellow area), as one may expect, played a significant role in the widening of lending spreads in Italy and Spain after 2010. Following the ECB's announcement of the Outright Monetary Transactions (OMT) programme in August 2012, these spreads moderated, although lending rates failed to decline. On the other hand, during episodes of financial market turbulence, safe haven flows exerted downward pressure on government bond yields in the United States and United Kingdom, as well as Germany and France. This is reflected in a negative contribution to the lending spread.

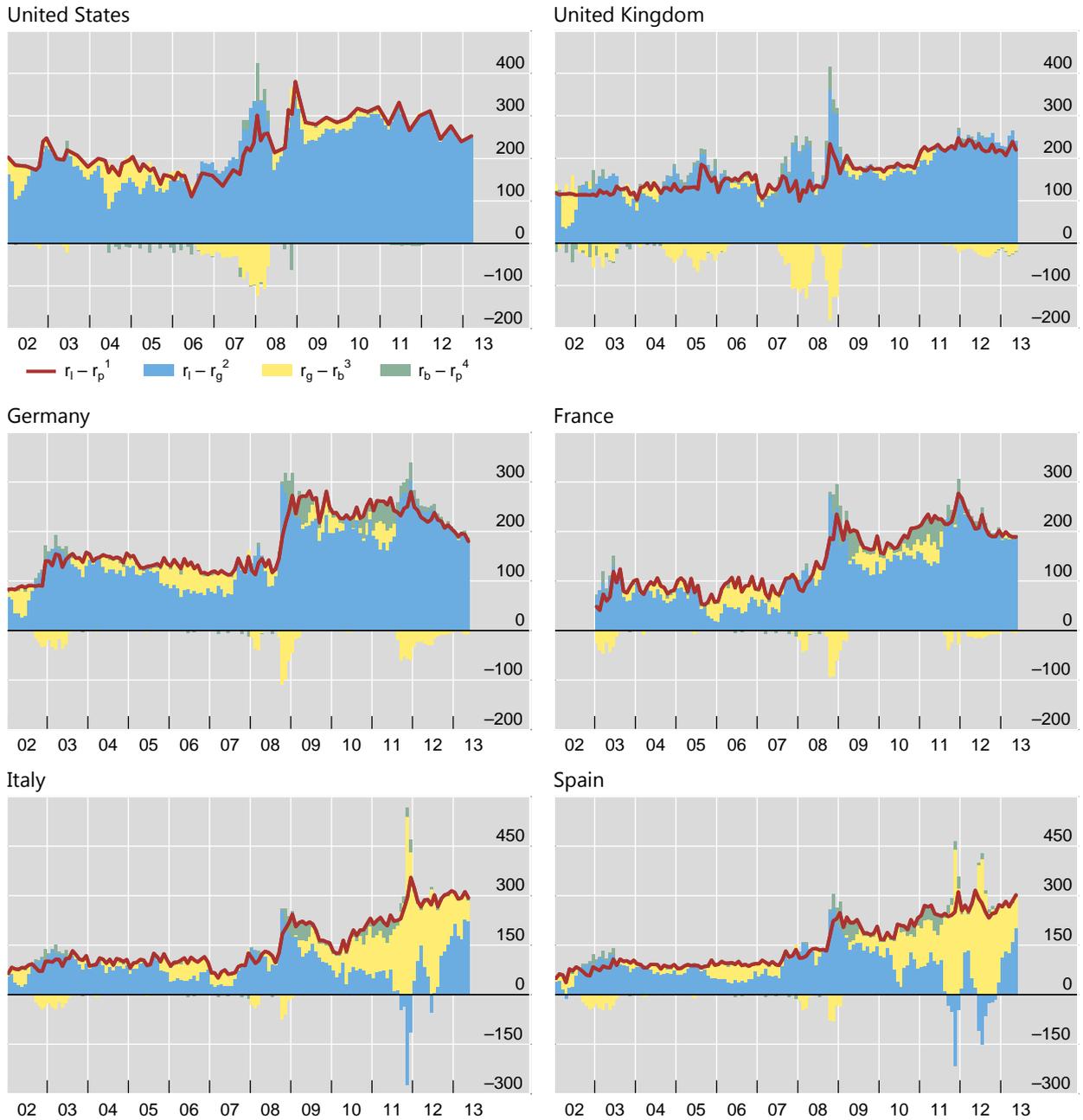
⁴ This hinges on the fact that the interbank money market is believed to be the primary channel for the implementation of monetary policy. When the crisis erupted, the interbank market broke down, and liquidity-easing measures implemented by central banks generated a larger than usual mismatch between official policy rates and interbank rates. See Beirne (2012) for a detailed analysis on the euro area.

⁵ Given that the maturity of loans included in the computation of the lending rate varies, the term premium could also partially affect this component. However, since we estimate the average maturity of the loans included in the computation of the lending rates to be around one year, this effect should be small. The spread between the lending rate and the government bond yield can also be influenced by oligopolistic power in specific sectors of the lending markets. However, the sample we consider is sufficiently short to assume this factor to be constant.

Decomposition of the lending spread

In basis points

Graph 2



¹ Spread between the rate on loans to non-financial firms and the central bank policy rate. ² Spread between the rate on loans to non-financial firms and the 12-month sovereign bond yield. ³ Spread between the 12-month sovereign bond yield and the overnight interbank rate (effective federal funds rate for the United States, overnight GBP Libor for the United Kingdom and EONIA for the euro area countries). ⁴ Spread between the overnight interbank rate and the policy rate.

Sources: Bank of England; ECB; Federal Reserve; Bloomberg; Datastream; BIS calculations.

For all countries, the surge in the spread between lending rates and government bond yields (blue area) explains the bulk of the lending spread in the wake of the Great Recession. As mentioned above, this component incorporates the

Cointegration of policy and lending rates

The results reported in Graph 1 can be formalised by resorting to an econometric model which links lending rates to other interest rates in a cointegration framework. We estimate separate models for each country under scrutiny. The specification we adopt for euro area countries is:

$$r_l = \alpha + \beta r_b + e,$$

while for the United States and the United Kingdom it is

$$r_l = \alpha + \beta r_b + \gamma r_g + e.$$

The rationale for including government bond yields in the specification is that failing to do so would neglect the potential impact of large-scale asset purchases implemented by the Federal Reserve and the Bank of England. Estimation is performed using the fully modified OLS estimator proposed by Phillips and Hansen (1990).^①

To pin down the level of bank lending rate that would have prevailed, given the current monetary policy stance, if the pass-through had worked as in the pre-crisis period, we first estimate cointegrating equations up to August 2008. We acknowledge that the sample is short and only covers a period of strong economic and financial expansion; results should therefore be taken as illustrative.

We then compute the fitted values for the rate on loans to non-financial firms, and interpret these as benchmark rates, ie the rates that would have prevailed given the current monetary policy stance had the pass-through worked as in the pre-crisis period. To gauge the deviation of actual rates from the medium-run benchmark level, we subtract the fitted values from the actual (observed) values for lending rates. Results are reported in Graph A, and basically convey the same message as the informal analysis in Graph 1.

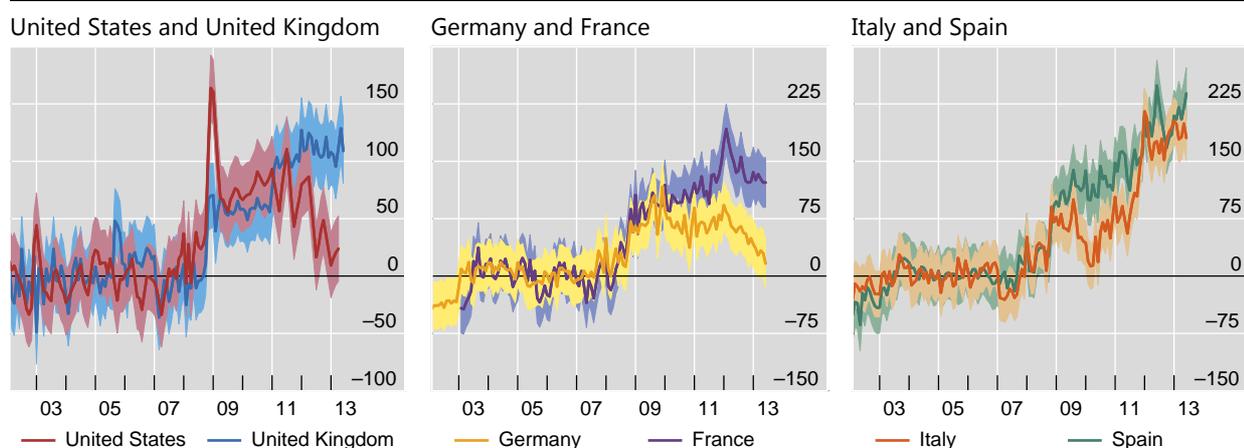
The fact that the difference between actual and fitted values drifts away from zero constitutes indirect evidence that the relationship tying together lending and policy rates has been subject to a structural change since the onset of the Great Recession. Of course, given the coverage of our sample, such change could be due to the economic downturn itself rather than some other form of impairment in the transmission of monetary policy.

^① Further details on the coefficient estimates and cointegration tests, as well as on the stability of the cointegrating relationship, are contained in a companion working paper (Illes and Lombardi (2013)).

Spread between actual and benchmark rates on loans to non-financial firms¹

In basis points

Graph A



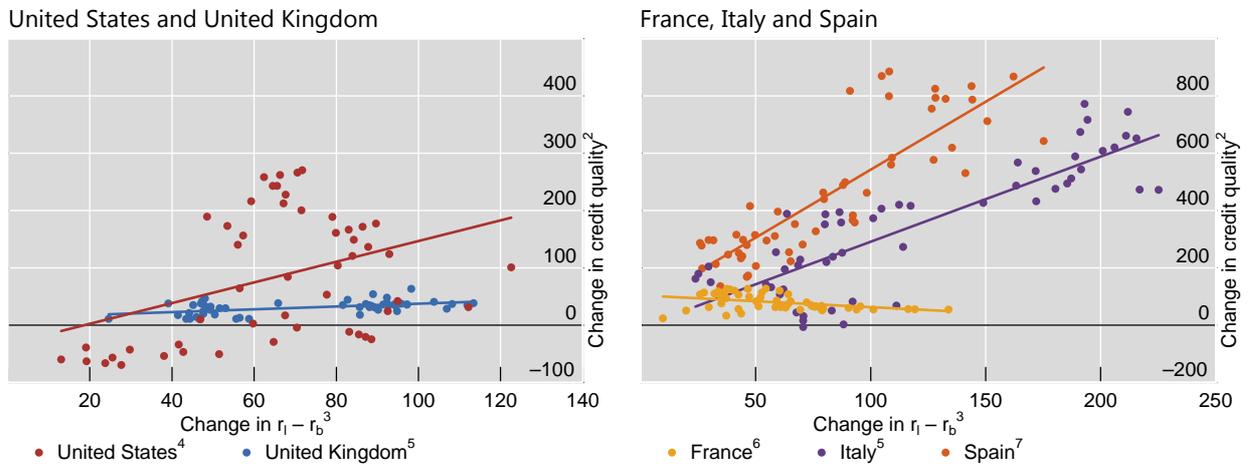
¹ Difference between actual rates and those implied by the cointegrating model. The ranges represent 90% confidence intervals.

Sources: Bank of England; ECB; Federal Reserve; Bloomberg; Datastream; BIS calculations.

Changes in the credit quality and in the spreads between rates on loans to non-financial firms and the overnight interbank rate¹

Changes since August 2008, in basis points

Graph 3



¹ No data available for Germany for non-performing loans. For definitions of the lending rates, see Box 1. ² A positive change represents a deterioration in credit quality. ³ Spread between rates on loans to non-financial firms and the overnight interbank rate (effective federal funds rate for the United States, overnight GBP LIBOR for the United Kingdom and EONIA for euro area countries). ⁴ All banks' delinquency rates on commercial and industrial loans. ⁵ Write-offs as a percentage of total lending to private non-financial firms. ⁶ Gross doubtful debts as a percentage of total lending to private non-financial firms. ⁷ Ratio of bad loans to total lending.

Sources: Bank of England; ECB; Federal Reserve; Bloomberg; Datastream; BIS calculations.

premium for heightened risk due to stagnant economic activity,⁶ as well as that related to the need of the banking system to deleverage. This component has recently become smaller in the United States, France and Germany, but has remained large in the United Kingdom.

So, deviations of the lending spread from the pre-crisis average may reflect a deterioration of the economic outlook leading lenders to require higher premia rather than a tightening in the supply of credit. To provide further evidence in this direction, Graph 3 plots the spread between lending rates and interbank rates against a measure of credit risk, ie the change in the percentage of non-performing loans since the onset of the Great Recession.⁷ The expected sign of the relationship is positive, but this is not the case in all countries: the slope is nearly flat in the United Kingdom and France.

Conclusion

Overall, the message one can take from our results is that the policies of near-zero interest rates maintained by central banks of major advanced economies have

⁶ Of course, the increase in the perception of risk could also be interpreted as a correction from the systematic underpricing of risk that took place in the years preceding the Great Recession.

⁷ This is only a rough measure of credit risk and has a number of caveats. First, accounting conventions and definitions of a non-performing loan differ across countries. Second, the recognition of losses can be delayed when banks are short of capital. Due to a lack of data on non-performing loans we could not include Germany in the analysis.

lowered lending rates to non-financial firms only to a limited extent. This lesser pass-through seems to be related in part to the higher premium for risk required by financial intermediaries.

Results for euro area countries are very diverse. Firms in Italy and Spain continue to face high bank financing costs. At the same time, lending rates in Germany and France trended downwards over the last few years. Divergent trends in lending rates are a clear challenge for the formulation of monetary policy.

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