The Low Monetary Rates Paradox, Banking Stability and Credit: Evidence from the Euro Area

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Abstract

Low monetary policy rates may induce risk-taking by banks, increasing the probability that a banking crisis occurs. Once the crisis starts, central banks may lower rates to support the weak banking system to avoid a credit crunch, in turn sowing the seeds for the next credit bubble. We provide evidence on this paradox of low monetary policy rates in the Euro area, where the unique dataset of the Euro area Bank Lending Standards and the institutional setting for monetary policy and prudential policy allow econometric identification. We find robust evidence that low monetary policy interest rates soften lending standards (the part of lending conditions unrelated to borrowers' risk) in the period prior to the crisis. Moreover, the impact of low short-term rates on credit and liquidity risk-taking is statistically and economically more significant than the effect of low long-term interest rates or current account deficits. Furthermore, the impact of low monetary policy rates on the softening of standards is reduced by more stringent prudential policy on either bank capital or LTVs. After the start of the 2008 crisis, we find that low monetary policy interest rates soften tightened lending conditions and terms that were present due to bank capital and liquidity constraints, especially for banks that borrow more long-term liquidity from the Eurosystem.

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1. Introduction

Since the start of the severe banking crisis of 2008, the question of whether low monetary policy rates spur risk-taking by banks is at the center of an intense academic and policy debate. Nominal rates during the 2002-2005 period were the lowest in the last decades, below Taylor-rule implied rates and even real rates were negative in several countries.[2]

It has been argued not only by commentators but also by economic theory that keeping monetary policy rates too low can increase banks' appetite for credit and liquidity risk due to banks' moral hazard problems.[3] This, in turn, increases the likelihood of a financial crisis originating by the accumulation of bank risk. But once the risk in the balance sheets of banks realizes and the crisis starts, the banking sector may then need low monetary policy rates to support credit supply for firms and households – especially for the banks with weaker balance sheets.[4]

The paradox is that while low monetary policy rates may induce risk-taking by banks, increasing the probability that a banking crisis occurs, once the crisis starts, the central banks may need to lower the rates to support the weak banking system and avoid a credit crunch, in turn sowing the seeds for the next credit bubble.[5]

[2] See Taylor (2008 and 2009), Calomiris (2009), Rajan (2010b), Diamond and Rajan (2009), Reinhart and Rogoff (2009), Allen and Rogoff (2011), Allen and Carletti (2010), Besley and Hennessy (2009) among others and multiple editorials and op-eds in the Wall Street Journal, the Financial Times and The Economist. See also Blanchard (2008 and 2009).

[3] See Allen and Rogoff (2011), Rajan (2010a), Adrian and Shin (2009 and 2010), Allen and Gale (2004 and 2007), Borio and Lowe (2002), Borio and Zhu (2008), Dell'Ariccia and Marquez (2006), Dell'Ariccia, Laeven and Marquez (2011), Valencia (2011), Diamond and Rajan (2006 and 2009). Please see Jiménez et al. (2011b) and Maddaloni and Peydró (2011) for a review of theoretical arguments that link monetary policy with credit and liquidity risk-taking.

[4] See e.g. Bernanke and Gertler (1995), Kashyap and Stein (2000), Gertler and Kiyotaki (2010), Adrian and Shin (2010), Jiménez et al. (2011a).

[5] See also Giavazzi and Giovannini (2010).

In this paper we empirically analyze this paradox for the Euro area, which has been a key economic area for the recent crisis and also has both a unique dataset on lending conditions and a unique institutional setting that allow econometric identification.

First, before the 2008 crisis, we analyze whether monetary policy rates affect lending terms and conditions for business and household loans, over and above other factors identified as culprits of the last crisis, as low long-term interest rates or current account deficits among others. We then analyze whether monetary policy rates affect changes in lending conditions due to changes on credit supply factors as bank capital, liquidity and competition and not due to demand-borrowers' changes in net worth and credit risk. The part of lending terms and conditions unrelated to borrower quality, therefore, reflects changes in credit and liquidity risk-taking. Finally, since banks' appetite for higher risk when monetary policy rates are low is due to banks' moral hazard problems, we analyze whether more stringent prudential supervision and regulation for banks affect the impact of monetary policy on lending standards. We use two cross-country measures of banking policy, one by the World Bank on the stringency of bank capital supervision and another one – even more related to macro-prudential policy – based on restrictions to loan-to-value ratios (LTV) applied in different countries as published in Warnock and Warnock (2008) and IMF (2011).[6]

Second, once the 2008 crisis starts, we analyze whether lower monetary policy rates soften lending conditions in general and also tightened lending conditions due to bank capital and liquidity problems (supply factors). Moreover, we analyze whether the potential softening is stronger in banking systems which cannot access private liquidity in wholesale markets and have higher need of long-term liquidity from the Eurosystem (credit enhancement operations carried out by the ECB through full allotment fixed-rate long-term liquidity operations).

[6] See Barth, Caprio and Levine (2006) for the measure of stringency of bank capital.

The empirical analysis of these questions in the Euro area is of particular interest for three main reasons: (i) the European economy and its banking sector were heavily affected since the beginning of the crisis. Moreover, bank finance constitutes around 75-80% of corporate finance in the Euro Area.[7] (ii) The unique data on lending conditions in the Euro Area, as we explain below, allows the identification of credit supply and risk-taking decisions distinguishing from demand. (iii) Monetary policy (nominal) rates in the Euro area are identical across countries, but there are significant differences in terms of GDP and inflation.[8] Moreover, banking supervision (and even somewhat regulation) is a responsibility of the national authorities, whereas the monetary policy is set by the Governing Council of the European Central Bank (ECB). Furthermore, as we will discuss later, through time fixed effects we can control for unobservable time-varying common shocks that affect the monetary policy decisions of the ECB and lending standards. In this case, the identification of monetary policy is largely cross-sectional which avoids the typical endogeneity problems of monetary policy to local economic conditions.

A major identification challenge faced when analyzing the credit channel of monetary policy is to disentangle changes in loan demand and in loan supply. It is very difficult to obtain data on the lending conditions applied to the pool of potential borrowers (including households and firms that were rejected), and to know whether, how and especially *why* banks change their lending conditions. For identification, we use the detailed answers of the confidential and unique Bank Lending Survey (BLS) for the Euro area countries. Euro area national central banks request banks to provide quarterly information on the lending standards that they apply to firms and households. The detailed information reported is very reliable, not

[7] See Allen, Chui and Maddaloni (2004) for a comparison of the financial systems of Europe, USA and Asia.
[8] See e.g. Camacho et al. (2008) and Taylor (2009).

least because the surveys are carried out by central banks, which are in most cases the bank supervisors and cross-check the information received with exhaustive hard banking data.[9]

The BLS crucially reports on the factors affecting banks' lending conditions, which is a key piece of information to analyze credit and liquidity risk by banks. These factors can be grouped into (i) quality and risk of loan applicants (demand) related to the net worth, collateral and credit risk of borrowing firms and households, and into (ii) risk-taking, which we define as changes in lending conditions not related to borrowers' credit risk, but related to bank balance-sheet capacity and competition. This detailed information is therefore crucial to identify the impact of monetary policy on loan supply and risk-taking.

We find robust evidence that – prior to the start of the 2008 crisis – low (monetary policy) short-term interest rates soften lending conditions and terms, for both firms and households. Furthermore, low short-term rates also soften lending standards when we only analyze changes in loan conditions and terms due to changes in (supply factors) as bank net worth, liquidity and competition. Moreover, the impact of low short-term rates on lending standards is statistically and economically more significant than the effect of low long-term interest rates or current account deficits. In fact, we do not find robust evidence that low long-term rates and current account deficits correlate with soft lending standards. Finally, we find that the impact of low monetary policy rates on the softening of lending standards is reduced by more stringent prudential policy on either bank capital or LTV.

We find some evidence on "excessive risk-taking" for mortgages loans. We identify excessive risk-taking as the softening impact of lower monetary policy rates on lending

[9] See Del Giovane et al. (2010) for an example of publicly available cross-checking using detailed supervisory data on bank lending from Italy. It should be noted that the lending standards from the surveys are not only correlated with actual credit spreads and volume (see Ciccarelli et al., 2011) but are also good predictors of credit and output growth (see Lown and Morgan, 2006, for the U.S. evidence, and De Bondt et al, 2010, for the Euro area).

standards for the marginal riskier borrowers (as opposed to average borrowers), controlling for key factors as the business cycle, long-term rates, aggregate bank capital and liquidity improvement, and, crucially, controlling for changes in improvements in borrower risk and quality. Controlling for long-term interest rates is also important as mortgage loans are long-term and should not react as much to short-term rates.

We find evidence that – after the start of the 2008 crisis – low (monetary policy) short-term interest rates soften tightened lending conditions and terms that were present due to bank capital and liquidity constraints. Moreover, these effects are stronger for banks that need more the long-term liquidity provided by the Eurosystem through its main "quantitative easing" policies (which reinforces the credit supply interpretation).[10]

Our contributions to the literature are the following: (1) Given the detailed data available in the Euro Area BLS, we can analyze whether there is evidence of credit and liquidity risk-taking by banks by focusing on changes in lending standards not related to borrower-demand (firm or household) fundamentals (risk and quality), but due to changes in (supply) bank net worth and competition (capital, liquidity and competition). In contrast, in Maddaloni and Peydró (2011) we analyze changes only in *overall* lending conditions, and overall lending conditions depend also on borrowers' quality net worth (that are therefore affected by "demand" factors) – moreover, we control for important factors as BLS credit demand changes. (2) We analyze the impact on lending standards (risk-taking) of short-term monetary policy rates versus other key factors as current account deficits and long-term interest rates. (3) We use LTV restrictions to analyze the impact on lending standards of the interaction between monetary policy and macro-prudential policy. (4) We analyze each lending condition as loan spread, volume, maturity, collateral, LTV. (5) To identify excessive

[10] See Trichet (2009).

risk-taking, we analyze loan conditions such as spreads on riskier borrowers, over and above improvements in borrowers' quality and risk and controlling for long-term interest rates. (6) During the crisis we investigate on the impact of monetary policy on lending conditions and standards by considering changes in interest rates in conjunction with credit enhancement operations carried out by the ECB through full allotment long-term liquidity operations (the main quantitative easing policy of the Eurosystem). (7) Finally, we connect in the same paper the two sides of the paradox of too low monetary policy rates.

The rest of the paper proceeds as follows. Section 2 describes the Euro area data. Section 3 discusses the results, and Section 4 presents the conclusions.

2. Data

Lending standards

The main dataset used in the study are the answers from the Bank Lending Survey for the Euro area (the BLS). National central banks request that banks (senior loan officers, such as the chairperson of the bank's credit committee) provide quarterly information on the lending conditions and terms they apply to customers and on the loan demand they receive, distinguishing between business, mortgage, and consumer loans.[11] Concerning the supply of credit, attention is given to changes in lending conditions, in particular to the factors responsible for these changes, and to each of the different credit conditions and terms applied to customers (i.e., whether, why, and how lending conditions are changed).

The Euro area results of the survey – a weighted average of the answers received by banks in each Euro area country – are published every quarter on the website of the ECB. In a

[11] We report only the results of the analysis on business and mortgage loans. Consumer loans amount to around 10% of the total outstanding amount of bank loans in the Euro area.

few countries the aggregate answers of the domestic samples are published by the respective national central banks. However, the overall sample including all the answers at the country and bank level is confidential.

Data from the Euro area BLS are available since 2002:Q4. The main set of questions did not change since the start of the survey. While the current sample covers the banking sector in the 17 countries comprising the Euro area, we restrict the analysis to the 12 countries in the monetary union as of 2002:Q4, thus we work with a balanced panel. Over this period we consistently have data for Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain. The sample of banks is representative of the banking sector in each country.[12] This implies that it may comprise banks of different size, although at the onset of the survey some preference was given to the inclusion of large banks.[13]

In the first part of the paper, we examine the impact of monetary policy on lending conditions and standards (bank risk-taking as defined in the Introduction) before the start of the financial crisis, i.e. we stop the analysis in 2008:Q3. In the second part we analyze the crisis periods up to 2010:Q4, when the Eurosystem implemented also non-standard measures of liquidity provision to the banking sector (full allotment fixed-rate long-term liquidity).

Since we are interested in the actual lending decisions by banks, we use the answers related to changes in lending standards over the previous three months (see Berg at al. (2003) for a detailed description of the BLS questions). The questions imply only qualitative answers and no figures are required: banks indicate softening, tightening or no change of standards. Following for instance Lown and Morgan (2006), we quantify the different answers on

[12] When foreign banks are part of the sample, the lending standards refer to the credit policy applied in the domestic market.
[13] See Berg et al. (2005).

standards by using the net percentage of banks that have tightened their lending standards over the previous quarter, which is defined as follows: the difference between the percentage of banks reporting a tightening of lending standards and the percentage of banks reporting a softening of standards. Therefore, a positive figure indicates a net tightening of lending standards. We use this variable for both corporate and mortgage loans.

In most regressions we use the questions on balance sheet factors affecting the decision to change lending standards. In other words we focus on the role that low interest rates and liquidity provision may play in relaxing bank balance sheet constraints and ultimately support bank lending to the non-financial sector through credit supply. We also use the answers related to balance sheet factors to analyze the effect of different supervision standards for bank capital and different norms for Loan-to-Value (LTV) ratios applied for mortgage loans across countries.

Figure 1 shows how lending conditions and standards have changed over time in the Euro area, in Germany and in Italy. The Figure shows that there is heterogeneity across the Euro area countries, concerning both the credit demand, credit conditions and the lending standards (change in loan conditions unrelated to borrowers' net worth and risk). Although factors related to borrower risk (general economic outlook and borrowers specific risks) have played a major role since the start of the crisis, factors related to bank balance sheet factors have been important as well and resurfaced in the last quarters due to the sovereign crisis (see in particular developments in Italy). At the same time, during the boom, especially when short-term interest rates were low, lending conditions were softer, especially due to bank balance-sheet factors and competition.

Table 1 and 6 describes the summary statistics of overall lending conditions and lending conditions due to change in bank balance sheet factors, before the crisis (Table 1) and during the crisis (Table 6).

Macroeconomic and financial variables

The macro and financial variables included in the main analysis are short-term (monetary policy) rates, long-term (government bond) interest rates, current account balance (over GDP), GDP growth, inflation, supervision standards for bank capital and restrictions on the maximum Loan-to-Value ratio applied to mortgage loans. We also collect data on total bank capital ratio and on bank liquidity (interbank ratio) from the balance sheets of the sample of banks of the Euro area countries included in Bankscope. In the analysis during the crisis we also use data on liquidity operations of the Eurosystem, in particular long-term liquidity (from 3-month to 1-year maturity).

For monetary policy, we use the quarterly average of overnight interest rates, the EONIA rate for the Euro area (as published by the ECB). Monetary conditions are also proxied by the Taylor rule residuals obtained by regressing the overnight rates on GDP growth and inflation.[14] We estimate the residuals for the Euro area with panel least squares (LS) regressions, imposing common coefficients for all 12 countries, given the common monetary policy. A positive residual indicates relatively high monetary policy rates (tight monetary conditions), while negative residuals proxy for low rates (soft conditions).

[14] Bernanke and Blinder (1992), among others, use the overnight interest rate as the indicator of the U.S. stance of monetary policy. In the Euro area, the Governing Council of the ECB determines the corridor within which the overnight money market rate (EONIA) can fluctuate. Therefore, the overnight rate is also a sensible measure of the monetary policy stance in the Euro area. For robustness, we have also used different Taylor rule specifications, both for the overnight and the 3-month EURIBOR (e.g., the rate implied by a standard Taylor rule with coefficients 0.5 for both inflation and output gap (see Taylor 1993)).

To assess the impact of long-term rates, we use the 10-year government bond interest rates for each Euro area country. We also include in the regressions the current account balance for each country (as % of GDP). Lending standards may be influenced also by the demand received, therefore we use the responses from the BLS related to the demand for loans as a control variable. The main macroeconomic controls are the annual real GDP growth rate and the inflation rate, defined as the quarterly average of monthly inflation rates expressed in annual terms. Interbank ratio and total capital ratio are used to control for bank liquidity and capital position, we take the median values of the ratios on total bank capital and interbank ratio from Bankscope.

Given that regulatory arbitrage for bank capital seems to have been key in precipitating the financial crisis (Acharya and Richardson 2010), we use a measure of supervision standards for bank capital, a bank capital stringency index. Capital stringency is an index of regulatory oversight of bank capital; it does not measure statutory capital requirements but the supervisory approach to assessing and verifying the degree of bank capital at risk (Barth, Caprio, Levine 2006; Laeven and Levine 2009).

A measure that it is often mentioned as a possible tool for macroprudential policy is the Loan-to-value ratio applied to mortgage loans. We use a measure of the LTV ratio restrictions applied in different Euro area countries; we take this information from a recent IMF publication (IMF (2011)).

Table 1 and 6 provide the summary statistics of all these variables. It is important to note that there is ample cross-country and over time heterogeneity in Taylor-rule residuals, business cycle and lending conditions (see also Figure 1, for the variation over time in Euro area, and Germany versus Italy for the cross-country variation of lending conditions).

3. Results

We first analyze the lending conditions and standards before the 2008 crisis (Tables 2 to 5), and then we analyze them during the crisis (Tables 7 to 9). We also provide some robustness analysis in an Appendix.

Lending conditions and standards before the crisis

The results are reported as follows. First, we analyze the impact of short-term interest rates on overall lending conditions without any controls (Table 2). Then, we repeat similar regressions including all the control variables we discussed in the previous section and time and country fixed effects (Table 3). Table 4 shows the results of regressions where the dependent variables are each term and condition for the loans. Finally, in Table 5 we analyze the interaction of monetary policy and banking prudential policies on lending conditions and standards (LTV restrictions and bank capital stringency).

Table 2 shows that lower monetary policy rates, either using overnight rates or Taylor-rule residuals, imply a posterior softening of overall lending conditions (columns 1 to 4) and of lending conditions due to bank balance sheet constraints (columns 5 to 14). The results are obtained with GLS panel estimation including the lagged lending standards as regressors to control for autocorrelation.

In the other Tables (Table 3 to 5) of the first part of the results, we include all the controls, including country fixed effects. Since the coefficient in Table 2 of the lag is positive and significant, there is a problem of endogeneity which may bias the GLS estimation when we include the fixed effects. To ensure robustness of the results, we resort in the following regressions to the GMM estimator proposed by Arellano and Bond (1991) (see also Arellano

(2003)) which uses lags of the dependent variable as instruments.[15][16] We also include time fixed effects to control for unobservable time-varying common shocks that affect lending standards and ECB monetary policy decisions.[17]

Table 3 shows again that lower monetary policy rates are followed by softer lending conditions, measured by overall conditions but also by conditions related to bank balance sheet factors. Table 3 shows that the results of Table 2 are robust to the inclusion of key controls as country and time fixed effects, GDP growth, inflation, long-term interest rates, current account balance, credit demand changes, and aggregate bank capital and liquidity.

Given that monetary policy rates imply changes in lending conditions over and above borrower risk (i.e. related to changes in bank net worth stemming from changes in bank capital and liquidity), the results indicate that monetary policy affects credit and liquidity risk-taking (i.e. banks soften lending conditions despite that the borrower credit risk remains constant).

Moreover, results are robust to the inclusion of aggregate bank liquidity and capital ratios, which suggest that low short-term rates soften lending conditions over and above the current balance sheet position of banks, thus hinting to a mechanism through a change in risk aversion (see Borio and Zhu, 2008).

Current account balance is not highly correlated with lending conditions and, if anything, current account deficits are associated to tighter lending conditions (see column 3). The coefficients of current account balance and long-term rates are generally not statistically

[15] Tough the Nickel bias induced by the presence of the lagged dependent variable with the country fixed effects would converge to zero for a T sufficiently high (with the thumb of rule in the literature higher than 20 periods). In this case estimation by OLS and GLS would be unbiased in our sample.
[16] All estimations are carried out using robust standard errors.
[17] All regressions in which we introduce controls include time fixed effects. In the Appendix we report Tables 3 to 5 without time fixed effects but with the other controls.

significant, which suggest that the impact of low short-term rates on credit and liquidity risk-taking is statistically and economically more significant than the effect of low long-term interest rates or current account deficits. Considering the information from the summary statistics of Table 1 and the coefficients of Table 3 of Taylor rates and of the key controls, monetary policy is also economically significant in explaining lending conditions.

In Table 4 we analyze the impact of monetary policy on the specific terms and conditions for loans. It is notable that low short-term rates have a significant softening impact on margins (lending rates) applied to both average and riskier loans, but also on loan volume, collateral, maturity, covenants, and LTV. These results suggest that banks take on higher credit risk when monetary policy rates are lower (lower spreads to riskier marginal borrowers, covenants and collateral), but also take on higher liquidity risk as they lengthen the maturity of loans.

In the last two columns of Table 4, we estimate a different regression to investigate "excessive risk-taking". We regress the changes in loan margins applied to riskier loans on Taylor-rule residuals controlling for the changes in lending conditions due to changes in borrowers' net worth from the BLS (therefore holding constant borrowers' quality) and controlling for all the other variables, importantly for long-term interest rates, GDP and aggregate bank capital and liquidity. The coefficient for mortgage loans remains significant, pointing out to higher risk taken by banks to the marginal borrowers when monetary policy rates are low before the onset of the financial crisis when granting mortgage loans.[18] Given that mortgage loans are long-term and we control for the relevant rates (i.e. the long-term rates), given that we also control for borrowers' quality (directly with the BLS answers and even through GDP) and also control for aggregate bank capital and liquidity (a more classical

[18] As reported Table 4 in the Appendix, both coefficients remain significant if we do not include time fixed effects.

bank lending channel), results suggest excessive risk-taking in bank lending when monetary policy rates are low.[19]

Finally, in Table 5 we analyze the interaction between monetary policy rates (Taylor-rule residuals) with banking prudential supervision/regulation measures. We use two key policy measures, one on bank capital supervision stringency and one on restrictions on LTVs.

We find some evidence that the impact of low monetary policy rates on the softening of lending standards (softening of lending conditions due to bank capital, liquidity or competition) is reduced by more stringent policy on either bank capital or LTV. Note that this is generally not the case with overall lending conditions (columns 1 to 4) but interestingly it holds with lending standards due to change in balance sheet factors – notably, change in lending conditions due to liquidity position for the capital supervision measure and with changes in lending conditions due to bank competition for the LTV measure, which further reinforces the interpretation that more stringent prudential policy reduces the impact of low monetary policy rates on bank risk-taking.

Lending conditions and standards during the crisis

The results are reported as follows. We first analyze the impact of short-term interest rates on overall lending conditions during the crisis (Table 7) with no controls and using GLS estimation as in Table 2. Then, we use GMM and include all the controls as we have done before the crisis, reporting results with and without time fixed effects (Table 8). In the last set of estimations (Table 9) we differentiate banks by the long-term liquidity borrowed from the Euroystem as explained in Section 3.

Table 7 shows that after the start of the 2008 crisis low (monetary policy) short-term interest rates have softened overall lending conditions and tightened lending conditions due to

[19] See Bernanke and Blinder (1992) for the bank lending channel.

bank capital and liquidity constraints. Low monetary policy rates – by improving bank liquidity and capital – increase credit availability for both firms and households. The coefficients are always significant when including overnight rates but the result is less robust with Taylor-rule residuals.[20] In Table 8a, we carry out similar estimations with GMM and include all the control variables, which may be more important than in the period before the crisis given the large shocks occurred during the crisis. The results of Table 7 are confirmed for business loans but not for mortgage loans. In Table 8b, where we do not include time fixed effects (due to the small number of observations), the coefficients of Taylor-rule residuals are also significant for business loans.

The impact of short-term rates is stronger for banks that need the long-term liquidity provided by the ECB (i.e. those who do not access private, wholesale markets), which reinforces the credit supply channel. Table 9 suggests that in an environment where the banking sector is facing significant liquidity constraints, lower monetary policy rates combined with access to Eurosystem long-term liquidity reduce these liquidity constraints (see interaction between short-term rates and liquidity provisions). This in turn softens lending standards applied by the banks and contributes to credit availability for firms and households.

4. Conclusions

Commentators and academics have since the beginning of the 2008 crisis argued that keeping monetary policy rates too low can increase banks' appetite for credit and liquidity risk due to banks' moral hazard problems. This, in turn, increases the likelihood of a financial crisis originating by the accumulation of bank risk. But once the risk in the balance sheets of

[20] It should be noted that the number of observations after the crisis is significantly lower than in the previous regressions. This may decrease significantly the power of the estimation.

banks realizes and the crisis starts, the banking sector may then need low monetary policy rates to support credit supply for firms and households – especially the banks with weaker balance sheet strength.

In this paper we empirically analyze this paradox for the Euro area and our evidence is consistent with this paradox. We believe that our findings shed light on the impact of monetary policy on lending conditions and standards, with implications concerning the origins and development of the current crisis, but also have important forward-looking policy implications. In particular, results suggest that monetary policy rates affect financial stability and its impact depend on bank balance sheet strength and on banking prudential policy. Therefore, monetary policy and prudential policy should be related. Monetary policy decisions should pay more attention to financial stability issues, while banking prudential supervision and regulation should take into account the effects induced by the low monetary policy environment.

The results may support that monetary policy leans against the wind in good times, though macro-prudential policies (for example, time-varying and counter-cyclical LTV values or capital requirements) may alleviate the need for monetary policy to act counter cyclically by leaning against the wind. Moreover, if the balance sheet position of banks were stronger when entering a crisis period (for example, with higher bank capital), there would be less need for low monetary policy rates to support credit supply from banks, which otherwise could foster excessive bank risk-taking in the medium term. Our results, therefore, support the new responsibilities of central banks on macro-prudential supervision and regulation, in particular the new responsibilities of the European Central Bank and of the Federal Reserve on macro-prudential policies to monitor systemic risk.

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Figure 1: Lending standards and demand for loans

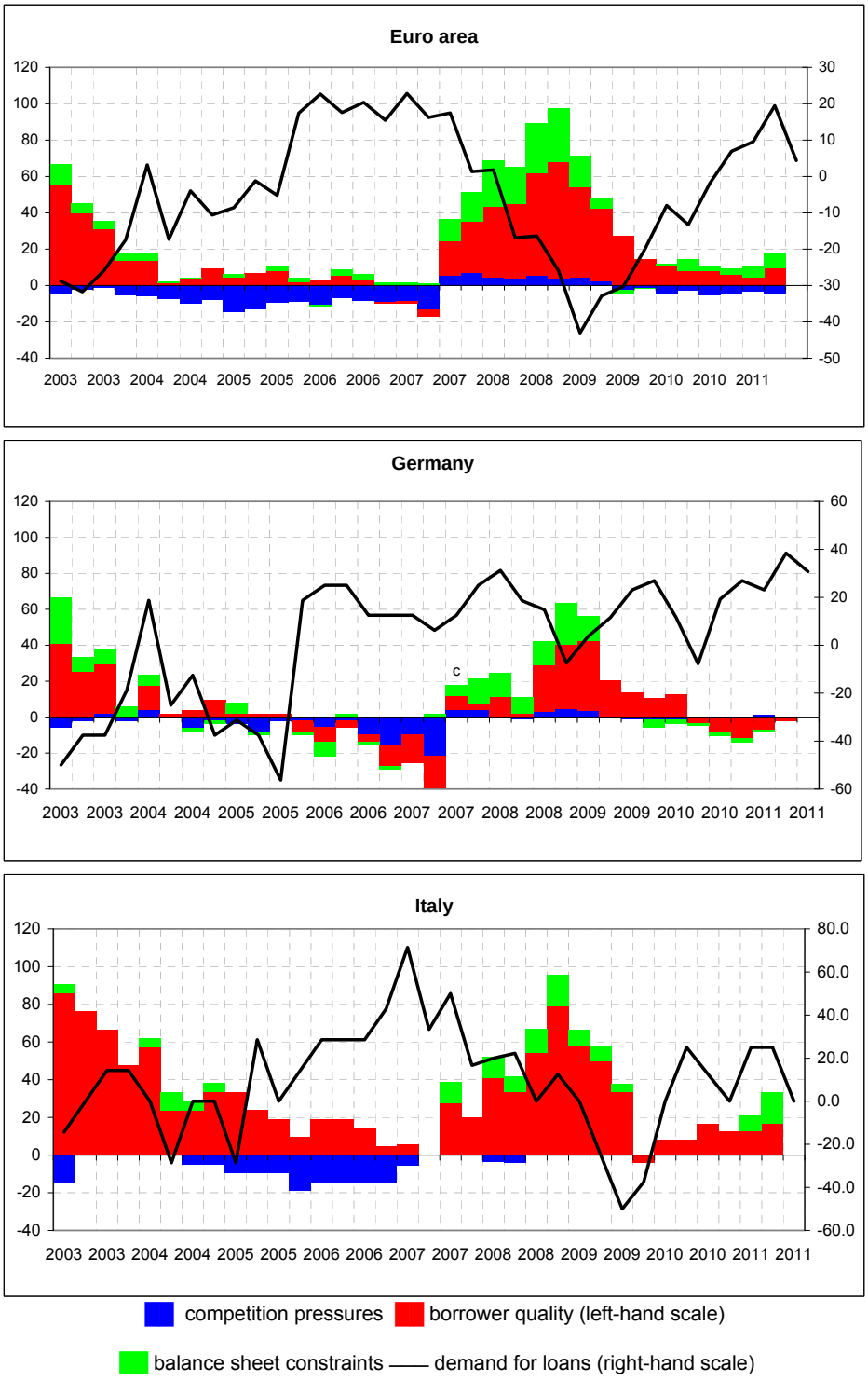

Figure 1 plots the lending standards and the demand for loans in the Euro area, in Germany and in Italy as reported in the Bank Lending Survey. The responses refer to business (non-financial corporations) loans. *Competition pressure* is the average of the responses to the questions referring to competition factors affecting the decision to change lending standards (bank, non-bank and market financing competition). *Balance sheet constraints* is the average of the responses to the questions referring to balance sheet factors affecting the decision to change lending standards (capital position, liquidity position and market financing conditions). *Borrower quality* is the average of the responses to the questions referring to borrower risk factors affecting the decision to change lending standards (economic outlook and borrower specific risks). Demand for loans is the net percentage of banks answering that the demand for loans has increased. They are the answers to Questions 2 and 4 of the BLS. See the appendix for a detailed description of the survey questions.

Sources: European Central Bank, Bundesbank and Banca d'Italia

Table 1 Summary Statistics before the start of the financial crisis

	Mean	Std. Dev.	Min	Max
Overnight rates	2.80	0.79	2.02	4.05
Taylor-rule residuals	-0.12	0.76	-1.38	1.44
Interbank ratio	91.18	41.53	32.27	232.61
Total capital ratio	14.65	6.00	9.85	45.00
10-year rates	3.98	0.50	2.20	5.22
Current account balance (% of GDP)	0.58	7.39	-19.59	22.39
GDP growth	2.70	1.88	-1.86	8.08
Inflation	2.44	0.95	-0.17	4.98
Capital stringency index	5.26	1.18	3	7
Loan-to-value ratio (max value in %)	90.45	19.16	55	125
Demand for loans				
business loans	2.02	30.53	-100	71.43
mortgage loans	3.12	45.00	-100	100
Lending conditions				
business loans	17.83	31.14	-50	100
mortgage loans	2.95	28.75	-100	100
Lending standards due to balance sheet factors				
all balance sheet factors for business loans	8.16	15.89	-25	86.67
bank capital position	12.28	19.55	-25	100
bank liquidity position	4.57	15.30	-40	80
bank market financing	7.61	20.51	-40	100
all balance sheet factors for mortage loans	4.44	14.38	-66.67	80

Table 1 shows the summary statistics of the macroeconomic and financial variables used in the analysis before the start of the financial crisis. The statistics are calculated over the period 2002:Q3-2008:Q2 for the Euro area. The Euro area includes data for 12 Euro area countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The overnight rate is the quarterly average of the daily overnight rate (EONIA). The Taylor rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. The interbank ratio and the total capital ratio are the medians by country of these measures from the sample of Euro area banks as reported in Bankscope. The 10-year rate is the long-term government bond interest rate in each country. The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. Capital stringency is an index of stringency of capital requirements (Barth, Caprio and Levine 2006). The max Loan-to-Value ratio is the maximum ratio applied to mortgage loans in each country as reported in IMF (2011). The demand for loans is the net percentage of banks that have answered that the demand for business or mortgage loans has increased (Question 4 and 13 of the Euro area Bank Lending Survey, BLS). The statistics for lending conditions and lending standards due to balance sheet factors are calculated over the period 2002:Q4-2008:Q3. Lending conditions is the net percentage of banks reporting a tightening of credit standards for the approval of loans or credit lines to enterprises and households in the BLS. They are the answers to Questions 1 and 8 of the survey. Lending standards due to balance sheet factors is the net percentage of banks reporting a tightening of credit standards due to costs of funds and balance sheet constraints (bank capital, liquidity and market financing) for loans or credit lines to enterprises and households (they are the answers to Questions 2 and 9 of the BLS). See the appendix for the relevant questions from the survey and Berg et al. (2005) for a detailed description of the survey.

Table 2

Impact of monetary policy before the crisis

	Lending conditions				Lending standards due to balance sheet factors									
							Business loans						Mortgage loans	
	Business Loans		Mortgage Loans		All factors		Bank capital position		Bank liquidity position		Bank market financing		All factors	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Overnight rates *t-1*	12.52		7.17		5.60		3.38		5.40		6.87		3.18	
	[7.09]***		[6.44]***		[7.94]***		[3.77]***		[8.09]***		[6.26]***		[7.34]***	
Taylor-rule residuals *i,t-1*		10.05		6.08		4.24		2.45		4.45		5.73		2.50
		[5.92]***		[5.39]***		[6.09]***		[3.00]***		[7.07]***		[5.50]***		[6.26]***
Lagged dependent *i,t-1*	0.65	0.71	0.64	0.66	0.62	0.63	0.63	0.64	0.58	0.60	0.60	0.62	0.65	0.64
	[16.58]***	[18.92]***	[16.22]***	[16.72]***	[15.00]***	[14.84]***	[17.44]***	[17.75]***	[12.79]***	[13.50]***	[13.16]***	[13.22]***	[14.93]***	[14.03]***
Country fixed effects	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Time fixed effects	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Wald statistic	495.97	489.04	418.19	370.46	482.56	395.22	351.39	344.8	461.5	415.5	310.83	286.25	436.88	359.08
# of observations	276	276	276	276	276	276	276	276	276	276	276	276	276	276
# of countries	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Table 2 shows the results of GLS panel regressions where the dependent variable *lending conditions* (columns 1 to 4) is the net percentage of banks in each country reporting a tightening of credit standards in the Euro area Bank Lending Survey (BLS) for the approval of loans or credit lines to enterprises and households. They are the answers to Questions 1 and 8 of the BLS. The dependent variable *lending standards due to balance sheet factors* (columns 5 to 14) is the net percentage of banks reporting a tightening of credit standards in the BLS due to the factor in the headings (for business loans: all balance sheet factors, bank capital position, bank liquidity position and bank market financing. For mortgage loans: all balance sheet factors). They are the answers to Questions 2 and 9 of the BLS. The overnight rate is the quarterly average of the daily overnight rate (EONIA). The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2002:Q4-2008:Q3. The test statistics are in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. All the panel regressions include standard errors allowing heteroscedasticity, autocorrelation of order one and time-invariant correlation across countries.

Table 3

Impact of monetary policy before the crisis

	Lending conditions		Leding standards due to balance sheet factors				
				Business loans			Mortgage loans
	Business loans	Mortgage loans	All factors	Bank capital position	Bank liquidity position	Bank market financing	All factors
	1	2	3	4	5	6	7
Taylor-rule residuals *i,t-1*	24.456	11.16	5.152	7.394	5.127	6.394	7.856
	[4.26]***	[2.28]**	[2.08]**	[2.37]**	[2.38]**	[1.82]*	[1.91]*
Interbank ratio *i,t-1*	-0.003	-0.114	-0.001	0.043	0.006	-0.055	0.036
	[0.07]	[3.01]***	[0.04]	[1.44]	[0.24]	[1.13]	[1.83]*
Total capital ratio *i,t-1*	-0.70	-0.11	-0.02	-0.06	0.12	0.18	0.26
	[2.01]**	[0.38]	[0.12]	[0.40]	[1.16]	[0.88]	[2.07]**
Demand for loans *i,t-1*	-0.14	-0.09	-0.03	-0.03	-0.05	0.00	0.03
	[3.57]***	[2.40]**	[0.64]	[0.45]	[1.25]	[0.04]	[1.79]*
Current account balance *i,t-1*	0.03	-0.33	-0.31	-0.19	-0.47	-0.15	0.04
	[0.06]	[0.78]	[1.77]*	[0.88]	[1.85]*	[0.72]	[0.25]
10 -year rate *i,t-1*	-6.97	3.87	2.48	-2.57	7.60	2.98	6.12
	[1.01]	[0.47]	[0.93]	[0.58]	[4.25]***	[0.90]	[1.18]
GDP growth *i,t-1*	0.27	-2.27	-0.02	-0.35	0.05	0.35	-0.71
	[0.33]	[1.67]*	[0.04]	[0.45]	[0.06]	[0.41]	[0.77]
Inflation *i,t-1*	6.09	-2.92	0.99	-0.67	0.69	3.27	0.64
	[2.60]***	[1.38]	[1.17]	[0.42]	[0.57]	[1.97]**	[0.16]
Lagged dependent *i,t-1*	0.33	0.31	0.47	0.51	0.41	0.47	0.27
	[4.78]***	[3.60]***	[8.51]***	[9.01]***	[5.44]***	[6.01]***	[3.18]***
Country fixed effects	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes	yes
# of observations	264	264	264	264	264	264	252
# of countries	12	12	12	12	12	12	12

Table 3 shows the results of a GMM dynamic panel estimation where the dependent variable *lending conditions* (columns 1 and 2) is the net percentage of banks in each country reporting a tightening of credit standards in the Euro area Bank Lending Survey (BLS) for the approval of loans or credit lines to enterprises and households. They are the answers to Questions 1 and 8 of the BLS. The dependent variable *lending standards due to balance sheet factors* (columns 3 to 7) is the net percentage of banks reporting a tightening of credit standards in the BLS due to the factor in the headings (for business loans: all balance sheet factors, bank capital position, bank liquidity position and bank market financing. For mortgage loans: all balance sheet factors). They are the answers to Questions 2 and 9 of the BLS. The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. The interbank ratio and the total capital ratio are the medians by country of these measures from the sample of Euro area banks as reported in Bankscope. The demand for loans is the net percentage of banks answering in the BLS that the demand for business or mortgage loans has increased (Questions 4 and 13 of the BLS). The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. The 10-year rate is the long-term government bond interest rate in each country. GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2002:Q4-2008:Q3. The test statistics are in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are robust.

Table 4

Impact of monetary policy on terms and conditions applied to loans

	Business Loans						Mortgage Loan					Margin on riskier loans	
	Margin on average loans	Margin on riskier loans	Size of the loan	Collateral requirement	Loan covenant	Maturity of the loan	Margin on average loans	Margin on riskier loan	Collateral requirement	Loan-to-Value ratio	Maturity of the loan	Business loans	Mortgage loans
	1	2	3	4	5	6	7	8	9	10	11	12	13
Taylor-rule residuals *i, t-1*	14.167	9.102	5.634	4.439	7.385	10.049	4.948	4.38	2.955	4.375	-0.561	7.566	9.295
	[3.93]***	[3.10]***	[2.59]***	[1.91]*	[2.60]***	[5.06]***	[1.72]*	[1.76]*	[2.28]**	[1.75]*	[0.24]	[1.57]	[2.81]***
Interbank ratio *i, t-1*	0.084	0.054	0.03	0.036	0.084	0.093	-0.075	-0.072	-0.055	-0.087	-0.035	0.058	-0.064
	[1.09]	[1.40]	[1.04]	[1.27]	[1.45]	[1.25]	[2.04]**	[0.98]	[1.99]**	[1.22]	[0.80]	[1.41]	[1.18]
Total capital ratio *i, t-1*	-0.03	0.27	0.15	0.228	-0.08	0.26	-0.01	-0.34	0.14	-0.26	-0.298	-0.413	-0.401
	[0.08]	[0.76]	[0.70]	[1.24]	[0.20]	[0.86]	[0.04]	[2.60]***	[2.20]**	[1.03]	[0.96]	[0.97]	[1.86]*
Demand for loans *i, t-1*	-0.03	-0.06	-0.04	-0.049	-0.11	-0.03	-0.06	-0.03	-0.03	-0.09	-0.101	0	-0.041
	[0.56]	[1.14]	[2.08]**	[0.84]	[2.47]**	[0.55]	[2.00]**	[0.84]	[1.24]	[3.83]***	[3.51]***	[0.01]	[1.12]
Current account balance *i, t-1*	-0.27	-0.48	-0.48	-0.566	-0.38	-0.22	0.41	0.28	0.07	0.04	-0.083	-0.656	0.231
	[0.78]	[1.33]	[2.36]**	[2.11]**	[0.98]	[0.60]	[0.46]	[0.84]	[0.24]	[0.15]	[0.21]	[2.73]***	[0.74]
10-year rate *i, t-1*	13.703	8.626	4.406	3.124	1.766	2.572	11.306	7.426	2.531	2.632	4.388	-2.79	-0.175
	[3.21]***	[2.66]***	[1.33]	[0.98]	[0.48]	[0.93]	[2.91]***	[2.42]**	[1.54]	[0.94]	[1.70]*	[0.32]	[0.02]
GDP growth *i, t-1*	-2.883	-2.659	-2.071	-0.117	-2.424	-1.602	-1.356	-1.936	-1.599	-2.821	0.855	-0.026	-0.437
	[2.10]**	[1.82]*	[2.09]**	[0.11]	[1.72]*	[2.22]**	[0.71]	[2.42]**	[2.92]***	[1.80]*	[1.15]	[0.01]	[0.38]
Inflation *i, t-1*	9.65	10.20	6.16	6.121	3.70	6.25	6.20	4.61	0.85	-2.14	2.379	6.811	-0.291
	[3.49]***	[3.64]***	[3.39]***	[3.68]***	[1.92]*	[2.26]**	[2.20]**	[2.09]**	[1.30]	[1.49]	[1.94]*	[2.50]**	[0.09]
General economic conditions *i, t-1*												0.103	0.007
												[1.60]	[0.07]
Industry/firm outlook *i, t-1*												0.051	
												[0.79]	
Risk of collateral *i, t-1*												0.113	
												[0.94]	
Housing market prospects *i, t-1*													0.155
													[3.19]***
Lagged regressor *i, t-1*	0.487	0.39	0.439	0.618	0.422	0.406	0.517	0.494	0.379	0.443	0.24	0.166	0.347
	[9.16]***	[5.25]***	[4.71]***	[6.81]***	[4.55]***	[5.86]***	[6.29]***	[6.34]***	[4.96]***	[4.00]***	[3.73]***	[1.76]*	[5.18]***
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
# of observations	264	264	264	264	264	264	264	264	264	264	264	264	264
# of countries	12	12	12	12	12	12	12	12	12	12	12	12	12

Table 4 shows the results of a GMM dynamic panel estimation where the dependent variable is the net percentage of banks in each country reporting a tightening of the terms and conditions for approving loans or credit lines to enterprises (columns 1 to 6) and to households for house purchase (columns 7 to 11) in the Euro area Bank Lending Survey (BLS). They are the answers to Questions 3 and 10 of the BLS. The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation over the period 2002:Q3-2008:Q2. The interbank ratio and the total capital ratio are the medians by country of these measures from the sample of Euro area banks as reported in Bankscope. The demand for loans is the net percentage of banks answering in the BLS that the demand for business or mortgage loans has increased (Questions 4 and 13 of the BLS). The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. The 10-year rate is the long-term government bond interest rate in each country. GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. In columns 12 and 13 the dependent variable is the net percentage of banks reporting a tightening of terms and conditions for riskier business and mortgage loans. In these regressions the additional controls are: the net percentage of banks reporting a tightening of credit standards due to general economic conditions, industry/firm outlook and risk of collateral (for business loans) and to housing market prospects and general economic conditions (for mortgage loans). These controls are the answers to Questions 2 and 9 of the BLS. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2002:Q4-2008:Q3. The test statistics are in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are robust.

Table 5

Interaction between monetary policy, max Loan-to-Value and capital stringency index

	Mortgage loans			Business loans		
	Lending conditions	Balance sheet factors	Bank competition	Lending conditions	Bank capital position	Bank liquidity position
	1	2	3	4	5	6
Taylor-rule residuals i,t-1	9.519	-20.03	-29.962	3.005	14.024	22.885
	[0.30]	[1.09]	[1.73]*	[0.20]	[1.92]*	[3.93]***
(TR-residual * max LTV) i,t-1	3.212	15.174	16.925			
	[0.20]	[1.67]*	[1.99]**			
Capital stringency i,t-1				-49.00	2.49	39.04
				[1.27]	[0.14]	[3.60]***
(TR-residual * Capital stringency) i,t-1				14.77	-4.53	-11.67
				[1.30]	[0.81]	[3.81]***
Interbank ratio *i,t-1*	-0.041	0.033	-0.07	0.012	0.037	-0.015
	[0.52]	[1.67]*	[0.73]	[0.30]	[1.19]	[0.61]
Total capital ratio *i,t-1*	0.251	0.239	-0.169	-0.618	-0.048	0
	[0.86]	[2.36]**	[0.39]	[1.94]*	[0.30]	[0.00]
Demand for loans *i,t-1*	-0.014	0.055	-0.032	-0.007	-0.061	-0.043
	[0.18]	[3.08]***	[0.84]	[0.12]	[1.57]	[0.98]
10 -year rate *i,t-1*	-17.869	0.817	10.426	-12.808	-1.014	12.205
	[0.22]	[0.06]	[0.28]	[1.65]*	[0.27]	[3.75]***
Current account balance *i,t-1*	-0.024	-0.007	0.322	0.044	-0.185	-0.403
	[0.04]	[0.05]	[0.72]	[0.07]	[0.85]	[1.66]*
GDP growth *i,t-1*	-4.089	-0.935	-2.629	-1.188	0.096	0.255
	[2.67]***	[1.27]	[2.11]**	[1.33]	[0.18]	[0.32]
Inflation *i,t-1*	-1.665	-6.831	-10.312	-0.052	0.659	5.497
	[0.19]	[1.18]	[1.78]*	[0.01]	[0.23]	[4.19]***
Lagged dependent i,t-1	0.25	0.17	0.365	0.348	0.502	0.374
	[4.16]***	[1.66]*	[5.39]***	[4.24]***	[9.75]***	[4.57]***
Country fixed effects	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes
# of observations	242	242	242	264	264	264
# of countries	11	11	11	12	12	12

Table 5 shows the results of a GMM dynamic panel estimation where the dependent variable in columns 1 to 3 is the net percentage of banks in each country reporting a tightening of lending conditions and of lending standards due to balance sheet factors and bank competition for mortgage loans in the Euro area Bank Lending Survey (BLS). They are the answers to Questions 8 and 9 of the BLS. In columns 4 to 6 the dependent variable is the net percentage of banks reporting a tightening of lending conditions and of lending standards due to bank capital and bank liquidity position for business loans in the BLS. They are the answers to Questions 1 and 2 of the BLS. The max LTV is the maximum Loan-to-Value ratio applied to mortgage loans in each country as reported in IMF (2011). Capital stringency is an index of stringency of capital requirements (Barth, Caprio and Levine 2006). The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. The interbank ratios and the total capital ratios are the median of these measures from the sample of Euro area banks as reported in Bankscope. The 10-year rate is the long-term government bond interest rate in each country. The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. The demand for loans is the net percentage of banks that have answered that the demand for business or mortgage loans has increased (Question 4 and 13 of the BLS). GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2002:Q4-2008:Q3. The test statistics are in brackets. *, **, and *** denotes statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are robust.

Table 6 Summary Statistics after the crisis

	Mean	Std. Dev.	Min	Max
Overnight rates	1.15	1.26	0.34	4.25
Taylor-rule residuals	-0.64	1.16	-3.36	1.48
Long-term liquidity provision (%GDP)	0.11	0.12	0.00	0.57
Interbank ratio	86.68	45.46	36.07	213.58
Total capital ratio	14.50	4.04	10.00	31.00
10-year rates	4.20	1.47	2.26	12.41
Current account balance (% of GDP)	0.15	7.19	-19.59	22.96
GDP growth	-1.42	3.37	-9.84	5.44
Inflation	1.43	1.71	-2.75	5.61
Demand for loans				
business loans	-15.40	35.28	-100.00	75.00
mortgage loans	-9.79	46.20	-100.00	75.00
Lending conditions				
business loans	23.83	35.77	-50.00	100.00
mortgage loans	19.76	30.64	-75.00	100.00
Lending standards due to balance sheet factors				
all balance sheet factors for business loans	12.78	24.54	-25.00	86.67
bank capital position	17.46	23.25	-25.00	80.00
bank liquidity position	5.34	27.12	-40.00	80.00
bank market financing	15.52	29.16	-40.00	100.00
all balance sheet factors for mortage loans	12.80	26.82	-60.00	100.00

Table 6 shows the summary statistics of the macroeconomic and financial variables used in the analysis after the start of the financial crisis. The statistics are calculated over the period 2008:Q3-2010:Q3 for the Euro area. The Euro area includes data for 12 Euro area countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The overnight rate is the quarterly average of the daily overnight rate (EONIA). The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. Long-term liquidity is the liquidity with longer maturity (from 3-month to 1-year) provided by the Eurosystem to the banking sector. The interbank ratio and the total capital ratio are the medians by country of these measures from the sample of Euro area banks as reported in Bankscope. The 10-year rate is the long-term government bond interest rate in each country. The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. The demand for loans is the net percentage of banks that have answered that the demand for business or mortgage loans has increased (Question 4 and 13 of the Euro area Bank Lending Survey, BLS). The statistics for lending conditions and lending standards due to balance sheet factors are calculated over the period 2008:Q4-2010:Q4. Lending conditions is the net percentage of banks reporting a tightening of credit standards for the approval of loans or credit lines to enterprises and households in the BLS. They are the answers to Questions 1 and 8 of the survey. Lending standards due to balance sheet factors is the net percentage of banks reporting a tightening of credit standards due to costs of funds and balance sheet constraints (bank capital, liquidity and market financing) for loans or credit lines to enterprises and households (they are the answers to Questions 2 and 9 of the BLS). See the appendix for the relevant questions from the survey and Berg et al. (2005) for a detailed description of the survey.

Table 7

Impact of monetary policy after the crisis

	Lending conditions				Lending standards due to balance sheet factors									
					Business loans								Mortgage loans	
	Business Loans		Mortgage Loans		All factors		Bank capital position		Bank liquidity position		Bank market financing		All factors	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Overnight rates *t-1*	8.51		3.54		2.98		2.05		2.59		3.79		4.79	
	[7.45]***		[3.96]***		[4.22]***		[2.89]***		[2.56]**		[3.68]***		[9.10]***	
Taylor-rule residuals *i,t-1*		1.00		0.36		0.78		1.39		0.47		1.58		2.69
		[0.69]		[0.45]		[1.77]*		[1.62]		[0.53]		[1.90]*		[6.91]***
Lagged dependent *i,t-1*	0.50	0.70	0.62	0.67	0.54	0.67	0.55	0.58	0.61	0.68	0.60	0.68	0.44	0.53
	[9.35]***	[10.75]***	[13.17]***	[12.96]***	[8.46]***	[10.71]***	[9.64]***	[10.02]***	[8.21]***	[9.90]***	[8.42]***	[9.89]***	[6.83]***	[10.51]***
Country fixed effects	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Time fixed effects	no	no	no	no	no	no	no	no	no	no	no	no	no	no
Wald statistic	877.95	232.15	211.83	174.76	583.41	210.06	237.17	189.93	216.39	146.29	164.83	134.27	132.02	154.71
# of observations	108	108	108	108	108	108	108	108	108	108	108	108	108	108
# of countries	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Table 7 shows the results of GLS panel regressions where the dependent variable *lending conditions* (columns 1 to 4) is the net percentage of banks in each country reporting a tightening of credit standards in the Euro area Bank Lending Survey (BLS) for the approval of loans or credit lines to enterprises and households. They are the answers to Questions 1 and 8 of the BLS. The dependent variable *lending standards due to balance sheet factors* (columns 5 to 14) is the net percentage of banks reporting a tightening of credit standards in the BLS due to the factor in the headings (for business loans: all balance sheet factors, bank capital position, bank liquidity position and bank market financing. For mortgage loans: all balance sheet factors). They are the answers to Questions 2 and 9 of the BLS. The overnight rate is the quarterly average of the daily overnight rate (EONIA). The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2008:Q4-2010:Q4. The test statistics are in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. All the panel regressions include standard errors allowing heteroscedasticity, autocorrelation of order one and time-invariant correlation across countries.

Table 8a

Impact of monetary policy after the crisis (without time fixed effects)

	Lending conditions				Lending standards due to balance sheet factors									
					Business loans								Mortgage loans	
	Business loans		Mortgage loans		All factors		Bank capital position		Bank liquidity position		Bank market financing		All factors	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Overnight rates *t-1*	16.56		3.37		4.40		4.59		5.61		6.74		3.02	
	[5.74]***		[1.27]		[1.95]*		[2.01]**		[1.66]*		[3.00]***		[0.73]	
Taylor-rule residuals *i,t-1*		16.56		3.37		4.40		4.59		5.61		6.74		3.02
		[5.74]***		[1.27]		[1.95]*		[2.01]**		[1.66]*		[3.00]***		[0.73]
Interbank ratio *i,t-1*	-0.06	-0.06	0.19	0.19	0.05	0.05	0.08	0.08	0.01	0.01	-0.01	-0.01	0.15	0.15
	[0.45]	[0.45]	[2.66]***	[2.66]***	[0.99]	[0.99]	[1.86]*	[1.86]*	[0.12]	[0.12]	[0.10]	[0.10]	[1.48]	[1.48]
Total capital ratio *i,t-1*	-1.34	-1.34	-0.63	-0.63	-1.76	-1.76	-1.61	-1.61	-1.54	-1.54	-2.52	-2.52	-0.53	-0.53
	[2.23]**	[2.23]**	[1.00]	[1.00]	[3.62]***	[3.62]***	[3.06]***	[3.06]***	[3.23]***	[3.23]***	[4.27]***	[4.27]***	[0.86]	[0.86]
Demand for loans *i,t-1*	0.19	0.19	0.04	0.04	0.06	0.06	0.08	0.08	0.03	0.03	0.05	0.05	0.29	0.29
	[2.19]**	[2.19]**	[0.83]	[0.83]	[0.90]	[0.90]	[1.56]	[1.56]	[0.30]	[0.30]	[0.83]	[0.83]	[3.28]***	[3.28]***
Current account balance *i,t-1*	-0.40	-0.40	-1.06	-1.06	-0.16	-0.16	-0.84	-0.84	-0.02	-0.02	-0.03	-0.03	-0.04	-0.04
	[2.46]**	[2.46]**	[5.03]***	[5.03]***	[0.58]	[0.58]	[2.04]**	[2.04]**	[0.04]	[0.04]	[0.05]	[0.05]	[0.09]	[0.09]
10 -year rate *i,t-1*	0.58	0.58	-0.78	-0.78	1.95	1.95	-3.58	-3.58	2.98	2.98	5.61	5.61	-9.94	-9.94
	[0.17]	[0.17]	[0.21]	[0.21]	[0.60]	[0.60]	[1.37]	[1.37]	[0.91]	[0.91]	[1.30]	[1.30]	[2.94]***	[2.94]***
GDP growth *i,t-1*	0.35	1.31	0.66	0.86	-0.33	-0.07	-1.08	-0.82	-1.25	-0.92	-0.84	-0.45	-1.08	-0.91
	[0.34]	[1.32]	[0.48]	[0.58]	[0.35]	[0.07]	[1.53]	[1.08]	[1.48]	[1.11]	[0.75]	[0.42]	[0.99]	[0.73]
Inflation *i,t-1*	-1.90	6.53	3.08	4.79	3.95	6.19	3.66	6.00	4.46	7.31	1.69	5.11	5.94	7.47
	[0.70]	[2.90]***	[0.88]	[1.93]*	[1.30]	[2.41]**	[1.31]	[2.96]***	[1.59]	[3.56]***	[0.65]	[1.96]*	[1.40]	[2.86]***
Lagged dependent *i,t-1*	0.14	0.14	0.40	0.40	-0.23	0.23	-0.02	-0.02	0.19	0.19	0.28	0.28	0.36	0.36
	[0.99]	[0.99]	[3.59]***	[3.59]***	[1.80]*	[1.80]*	[0.14]	[0.14]	[2.15]**	[2.15]**	[2.10]**	[2.10]**	[4.34]***	[4.34]***
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	no	no	no	no	no	no	no	no	no	no	no	no	no	no
# of observations	84	84	84	84	84	84	84	84	84	84	84	84	84	84
# of countries	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Table 8a shows the results of a GMM dynamic panel estimation where the dependent variable *lending conditions* (columns 1 and 2) is the net percentage of banks in each country reporting a tightening of credit standards in the Euro area Bank Lending Survey (BLS) for the approval of loans or credit lines to enterprises and households. They are the answers to Questions 1 and 8 of the BLS. The dependent variable *lending standards due to balance sheet factors* (columns 3 to 7) is the net percentage of banks reporting a tightening of credit standards in the BLS due to the factor in the headings (for business loans: all balance sheet factors, bank capital position, bank liquidity position and bank market financing. For mortgage loans: all balance sheet factors). They are the answers to Questions 2 and 9 of the BLS. The overnight rate is the quarterly average of the daily overnight rate (EONIA). The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. The interbank ratio and the total capital ratio are the medians by country of these measures from the sample of Euro area banks as reported in Bankscope. The demand for loans is the net percentage of banks answering in the BLS that the demand for business or mortgage loans has increased (Questions 4 and 13 of the BLS). The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. The 10-year rate is the long-term government bond interest rate in each country. GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2008:Q4-2010:Q4. The test statistics are in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are robust.

Table 8b

Impact of monetary policy after the crisis

	Lending conditions		Lending standards due to balance sheet factors				
				Business loans			Mortgage loans
	Business Loans	Mortgage loans	All factors	Bank capital position	Bank liquidity position	Bank market financing	All factors
	1	2	3	4	5	6	7
Taylor-rule residuals *i,t-1*	18.30	4.70	2.74	3.99	7.07	3.27	4.20
	[5.46]***	[0.99]	[0.80]	[2.29]**	[1.31]	[0.69]	[1.17]
Interbank ratio *i,t-1*	-0.11	0.12	0.05	0.05	0.09	0.00	0.17
	[1.04]	[1.15]	[0.90]	[0.87]	[1.21]	[0.05]	[1.65]*
Total capital ratio *i,t-1*	-1.09	-0.10	-1.90	-1.38	-2.34	-2.03	-0.71
	[1.98]**	[0.13]	[3.39]***	[1.47]	[3.94]***	[2.84]***	[0.87]
Demand for loans *i,t-1*	0.21	0.04	0.06	0.08	0.02	0.07	0.29
	[2.21]**	[0.61]	[0.88]	[1.49]	[0.26]	[1.26]	[2.92]***
Current account balance *i,t-1*	-0.48	-1.15	-0.24	-0.93	-0.09	0.39	-0.24
	[2.25]**	[4.06]***	[1.16]	[2.24]**	[0.25]	[1.31]	[0.59]
10 -year rate *i,t-1*	0.63	-3.99	4.52	-2.21	5.83	10.30	-12.53
	[0.19]	[0.96]	[0.95]	[0.48]	[1.42]	[1.67]*	[3.64]***
GDP growth *i,t-1*	3.03	2.43	0.54	0.52	-2.27	3.49	-1.16
	[1.24]	[0.78]	[0.32]	[0.41]	[2.30]**	[1.20]	[0.35]
Inflation *i,t-1*	8.55	4.86	6.56	7.33	7.24	7.87	6.92
	[3.25]***	[2.02]**	[2.68]***	[2.29]**	[3.47]***	[4.14]***	[1.66]*
Lagged dependent *i,t-1*	0.06	0.40	-0.27	-0.02	0.18	0.39	0.39
	[0.57]	[3.08]***	[2.07]**	[0.12]	[2.06]**	[2.92]***	[4.71]***
Country fixed effects	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes	yes
# of observations	84	84	84	84	84	84	84
# of countries	12	12	12	12	12	12	12

Table 8b shows the results of a GMM dynamic panel estimation where the dependent variable *lending conditions* (columns 1 and 2) is the net percentage of banks in each country reporting a tightening of credit standards in the Euro area Bank Lending Survey (BLS) for the approval of loans or credit lines to enterprises and households. They are the answers to Questions 1 and 8 of the BLS. The dependent variable *lending standards due to balance sheet factors* (columns 3 to 7) is the net percentage of banks reporting a tightening of credit standards in the BLS due to the factor in the headings (for business loans: all balance sheet factors, bank capital position, bank liquidity position and bank market financing. For mortgage loans: all balance sheet factors). They are the answers to Questions 2 and 9 of the BLS. The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. The interbank ratio and the total capital ratio are the medians by country of these measures from the sample of Euro area banks as reported in Bankscope. The demand for loans is the net percentage of banks answering in the BLS that the demand for business or mortgage loans has increased (Questions 4 and 13 of the BLS). The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. The 10-year rate is the long-term government bond interest rate in each country. GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2008:Q4-2010:Q4. The test statistics are in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are robust.

Table 9a

Impact of monetary policy and liquidity operations after the crisis (without time fixed effects)

	Lending conditions				Lending standards due to balance sheet factors									
					Business loans								Mortgage loans	
	Business loans		Mortgage loans		All factors		Bank capital position		Bank liquidity position		Bank market financing		All factors	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Taylor-rule residuals *i,t-1*	16.13	16.18	5.06	2.38	5.04	3.08	5.42	1.49	3.82	1.57	0.22	-1.00	0.39	1.36
	[5.01]***	[3.84]***	[2.19]**	[0.89]	[2.06]**	[1.13]	[1.56]	[0.38]	[1.53]	[0.61]	[0.09]	[0.31]	[0.10]	[0.25]
Long-term liquidity i,t-1	62.99	62.75	46.03	65.18	6.77	18.03	65.61	93.65	45.89	62.29	0.38	6.07	-10.82	-17.30
	[3.14]***	[2.62]***	[1.39]	[2.05]**	[0.25]	[0.47]	[1.43]	[2.96]***	[1.16]	[1.52]	[0.01]	[0.17]	[0.27]	[0.40]
(TR residuals * LT liquidity) i,t-1		-0.33		23.91		16.94		34.76		19.11		9.37		-7.93
		[0.03]		[2.71]***		[1.80]*		[3.70]***		[1.74]*		[0.84]		[0.63]
Interbank ratio *i,t-1*	-0.05	-0.05	0.05	0.07	0.08	0.10	0.03	0.07	0.05	0.07	0.19	0.20	0.06	0.05
	[0.40]	[0.40]	[0.99]	[1.48]	[1.84]*	[2.28]**	[0.48]	[1.01]	[0.56]	[0.85]	[2.20]**	[2.16]**	[0.85]	[0.71]
Total capital ratio *i,t-1*	-1.85	-1.85	-2.31	-2.29	-2.37	-2.40	-1.95	-1.90	-2.71	-2.70	-0.84	-0.81	-0.42	-0.43
	[2.57]**	[2.57]**	[3.82]***	[3.93]***	[2.99]***	[2.94]***	[3.47]***	[3.83]***	[3.38]***	[3.42]***	[1.23]	[1.15]	[0.90]	[0.91]
Demand for loans *i,t-1*	0.21	0.21	0.06	0.07	0.06	0.07	0.04	0.05	0.07	0.07	-0.12	-0.12	-0.08	-0.08
	[2.42]**	[2.42]**	[0.97]	[1.16]	[1.19]	[1.32]	[0.43]	[0.62]	[1.17]	[1.40]	[1.55]	[1.52]	[1.09]	[1.15]
Current account balance *i,t-1*	-0.24	-0.24	-0.20	-0.13	-0.92	-0.89	0.14	0.25	0.40	0.46	-1.13	-1.10	-0.20	-0.24
	[1.18]	[1.35]	[0.65]	[0.43]	[1.92]*	[1.88]*	[0.37]	[0.66]	[1.18]	[1.42]	[4.52]***	[4.25]***	[0.47]	[0.52]
10 -year rate *i,t-1*	-0.60	-0.59	1.85	0.43	-2.47	-3.42	1.25	-0.56	6.86	5.81	0.50	0.19	-5.36	-5.13
	[0.15]	[0.15]	[0.58]	[0.17]	[0.98]	[1.39]	[0.36]	[0.21]	[1.38]	[1.23]	[0.14]	[0.05]	[1.50]	[1.44]
GDP growth *i,t-1*	1.90	1.90	-0.75	-0.75	-1.68	-1.75	-0.87	-0.85	0.21	0.30	0.61	0.64	-1.39	-1.45
	[1.41]	[1.43]	[0.85]	[0.87]	[2.02]**	[2.27]**	[1.07]	[1.05]	[0.15]	[0.22]	[0.42]	[0.44]	[1.37]	[1.52]
Inflation *i,t-1*	6.62	6.61	7.11	8.31	5.99	6.75	8.22	9.94	6.33	7.15	4.02	4.34	6.55	6.30
	[2.37]**	[2.27]**	[2.64]***	[3.25]***	[3.09]***	[3.72]***	[3.24]***	[4.62]***	[1.99]**	[2.09]**	[1.45]	[1.41]	[2.57]**	[2.21]**
Lagged dependent *i,t-1*	0.10	0.10	-0.16	-0.19	-0.08	-0.10	0.16	0.12	0.35	0.34	0.32	0.32	0.16	0.16
	[0.94]	[0.93]	[1.17]	[0.95]	[0.53]	[0.65]	[1.78]*	[1.61]	[2.04]**	[1.90]*	[3.60]***	[3.51]***	[1.79]*	[1.81]*
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	no	no	no	no	no	no	no	no	no	no	no	no	no	no
# of observations	84	84	84	84	84	84	84	84	84	84	84	84	84	84
# of countries	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Table 9a shows the results of a GMM dynamic panel estimation where the dependent variable *lending conditions* (columns 1 and 2) is the net percentage of banks in each country reporting a tightening of credit standards in the Euro area Bank Lending Survey (BLS) for the approval of loans or credit lines to enterprises and households. They are the answers to Questions 1 and 8 of the BLS. The dependent variable *lending standards due to balance sheet factors* (columns 3 to 7) is the net percentage of banks reporting a tightening of credit standards in the BLS due to the factor in the headings (for business loans: all balance sheet factors, bank capital position, bank liquidity position and bank market financing. For mortgage loans: all balance sheet factors). They are the answers to Questions 2 and 9 of the BLS. The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. Long-term liquidity is the central bank liquidity borrowed at the long-term operations (3-month to 1-year) from the banking sector of each country divided by GDP. The interbank ratio and the total capital ratio are the medians by country of these measures from the sample of Euro area banks as reported in Bankscope. The demand for loans is the net percentage of banks answering in the BLS that the demand for business or mortgage loans has increased (Questions 4 and 13 of the BLS). The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. The 10-year rate is the long-term government bond interest rate in each country. GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2008:Q4-2010:Q4. The test statistics are in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are robust.

Table 9b

Impact of monetary policy and liquidity operations after the crisis

	Lending conditions				Lending standards due to balance sheet factors									
							Business loans						Mortgage loans	
	Business Loans		Mortgage Loans		All factors		Bank capital position		Bank liquidity position		Bank market financing		All factors	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Taylor-rule residuals *i,t-1*	20.03	20.33	4.38	1.05	3.28	0.48	7.62	3.42	4.63	1.87	10.90	9.91	2.69	3.43
	[5.29]***	[4.04]***	[1.31]	[0.33]	[1.23]	[0.19]	[1.40]	[0.60]	[1.08]	[0.43]	[2.21]**	[1.98]**	[0.77]	[0.79]
Long-term liquidity i,t-1	70.49	69.45	31.96	48.59	-29.42	-21.03	72.83	92.92	29.05	44.81	88.65	90.90	12.57	9.31
	[2.06]**	[1.98]**	[0.90]	[1.26]	[0.89]	[0.51]	[1.75]*	[2.30]**	[0.78]	[1.17]	[1.82]*	[1.73]*	[0.36]	[0.25]
(TR residuals * LT liquidity) i,t-1		-2.02		27.70		21.37		35.68		22.44		7.25		-5.55
		[0.18]		[3.34]***		[2.79]***		[3.61]***		[2.05]**		[0.56]		[0.45]
Interbank ratio *i,t-1*	-0.11	-0.12	0.06	0.09	0.06	0.09	0.11	0.14	0.00	0.02	0.10	0.10	0.10	0.09
	[1.14]	[1.15]	[1.05]	[1.27]	[1.15]	[1.63]	[1.47]	[1.67]*	[0.03]	[0.16]	[0.82]	[0.81]	[1.13]	[1.16]
Total capital ratio *i,t-1*	-1.47	-1.48	-2.58	-2.55	-2.21	-2.24	-2.70	-2.63	-2.45	-2.39	-0.30	-0.24	-0.60	-0.62
	[2.70]***	[2.64]***	[3.67]***	[3.63]***	[1.99]**	[1.99]**	[3.96]***	[3.71]***	[2.63]***	[2.61]***	[0.40]	[0.29]	[0.91]	[0.88]
Demand for loans *i,t-1*	0.22	0.22	0.05	0.07	0.06	0.06	0.03	0.04	0.07	0.09	-0.17	-0.17	-0.11	-0.11
	[2.42]**	[2.40]**	[0.81]	[1.00]	[1.13]	[1.32]	[0.36]	[0.55]	[1.16]	[1.40]	[1.76]*	[1.77]*	[1.30]	[1.34]
Current account balance *i,t-1*	-0.39	-0.40	-0.38	-0.28	-1.11	-1.06	0.00	0.14	0.21	0.30	-1.10	-1.08	-0.29	-0.32
	[1.68]*	[1.82]*	[1.62]	[1.22]	[2.26]**	[2.16]**	[0.01]	[0.33]	[0.67]	[1.00]	[3.61]***	[3.47]***	[0.71]	[0.73]
10 -year rate *i,t-1*	-1.82	-1.75	3.94	2.19	0.37	-0.94	2.85	1.25	9.21	7.86	-9.50	-9.82	-12.11	-11.93
	[0.45]	[0.45]	[0.93]	[0.53]	[0.10]	[0.27]	[0.67]	[0.29]	[1.70]*	[1.41]	[2.02]**	[1.90]*	[2.03]**	[1.99]**
GDP growth *i,t-1*	3.53	3.52	-0.57	-0.51	-0.81	-0.87	-2.09	-1.98	2.55	2.79	3.58	3.68	-1.99	-2.04
	[1.52]	[1.52]	[0.36]	[0.32]	[0.62]	[0.65]	[2.23]**	[2.27]**	[0.85]	[0.92]	[1.08]	[1.11]	[0.81]	[0.83]
Inflation *i,t-1*	9.21	9.17	7.06	8.40	6.21	7.10	8.32	9.98	8.32	9.34	9.87	10.19	6.23	6.07
	[3.18]***	[2.96]***	[2.69]***	[3.10]***	[2.27]**	[2.36]**	[3.28]***	[4.46]***	[3.82]***	[4.20]***	[2.66]***	[2.47]**	[1.62]	[1.46]
Lagged dependent *i,t-1*	0.05	0.05	-0.22	-0.26	-0.09	-0.12	0.15	0.11	0.32	0.31	0.29	0.29	0.19	0.19
	[0.52]	[0.49]	[1.11]	[0.81]	[0.70]	[0.92]	[1.67]*	[1.45]	[2.11]**	[1.96]*	[2.98]***	[2.79]***	[3.39]***	[3.68]***
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
# of observations	84	84	84	84	84	84	84	84	84	84	84	84	84	84
# of countries	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Table 9b shows the results of a GMM dynamic panel estimation where the dependent variable *lending conditions* (columns 1 and 2) is the net percentage of banks in each country reporting a tightening of credit standards in the Euro area Bank Lending Survey (BLS) for the approval of loans or credit lines to enterprises and households. They are the answers to Questions 1 and 8 of the BLS. The dependent variable *lending standards due to balance sheet factors* (columns 3 to 7) is the net percentage of banks reporting a tightening of credit standards in the BLS due to the factor in the headings (for business loans: all balance sheet factors, bank capital position, bank liquidity position and bank market financing. For mortgage loans: all balance sheet factors). They are the answers to Questions 2 and 9 of the BLS. The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. Long-term liquidity is the central bank liquidity borrowed at the long-term operations (3-month to 1-year) from the banking sector of each country divided by GDP. The interbank ratio and the total capital ratio are the medians by country of these measures from the sample of Euro area banks as reported in Bankscope. The demand for loans is the net percentage of banks answering in the BLS that the demand for business or mortgage loans has increased (Questions 4 and 13 of the BLS). The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. The 10-year rate is the long-term government bond interest rate in each country. GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2008:Q4-2010:Q4. The test statistics are in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are robust.

Appendix

The Bank Lending Survey

Question		Variable	Definition of variables
Supply of loans		**Lending conditions for:**	**Net percentage** is equal to the difference between the sum of banks answering "tightened considerably" and "tightened somewhat" and the sum of banks answering "eased somewhat" and "eased considerably" in percentage of the total number of banks.
Over the past three months, how have your bank's credit standards as applied to the approval of loans…	or credit lines to enterprises changed? (Q1)	business loans	
	to households for house purchase changed? (Q8)	mortgage loans	
Factors affecting the supply of loans			
Q2**:** Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of loans or credit lines to enterprises?	**A Costs of funds and balance sheet constraints** A1.Costs related to your bank's capital position. A2.Your bank's ability to access market financing. A3.Your bank's liquidity position. **B Pressure from competition** **C Perception of risk**	*Lending standards due to bank balance sheet factors* for corporate loans is equal to the average of the net percentage for A1, A2, and A3	**Net percentage** is equal to the difference between the sum of the banks answering "contributed considerably to tightening" and "contributed somewhat to tightening" and the sum of the banks answering "contributed somewhat to easing" and "contributed considerably to easing" in percentage of the total number of banks
Q9**:** Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of loans to households for house purchase?	**A. Costs of funds and balance sheet constraints** **B. Pressure from competition** **C. Perception of risk**	*Lending standards due to bank balance sheet factors* for mortgage loans is equal to the net percentage for A	
Conditions and terms for loans			
Q3**:** Over the past three months, how have your banks's conditions and terms for approving loans or credit lines to enterprises changed?	**A Price** Margins on average loans Margins on riskier loans **B Other conditions and terms** Non-interest rate charges Size of the loan or credit line Collateral requirements Loan covenants Maturity	*Conditions and terms for business loans*	**Net percentage** is equal to the difference between the sum of the banks answering that they have tightened each specific condition and and the sum of the banks answering that they have eased the same condition in percentage of the total number of banks
Q10**:** Over the past three months, how have your banks's conditions and terms for approving loans to households for house purchase changed?	**A Price** Margins on average loans Margins on riskier loans **B Other conditions and terms** Collateral requirements Loan-to-value ratio Maturity Non-interest rate charges	*Conditions and terms for mortgage loans*	
Demand for loans			
Over the past three months, how has the demand for loans…	or credit lines to enterprises changed at your bank, apart from seasonal fluctuations? (Q4)	*Demand for loans*	**Net percentage** is equal to the difference between the sum of banks answering that the demand has increased and the sum of banks answering that the demand has decreased in percentage of the total number of banks
	to households (for house purchase) changed at your bank, apart from normal seasonal fluctuations? (Q13)		

Appendix: Table 3 (without time fixed effects)

Impact of monetary policy after the crisis

	Lending conditions		Lending standards due to balance sheet factors				
				Business loans			Mortgage loans
	Business loans	Mortgage loans	All factors	Bank capital position	Bank liquidity position	Bank market financing	All factors
	1	2	3	5 4	5	6	7
Taylor-rule residuals *i,t-1*	11.49	3.94	4.23	3.22	2.64	5.88	-0.53
	[5.45]***	[1.29]	[6.20]***	[3.10]***	[3.24]***	[3.53]***	[0.22]
Interbank ratio *i,t-1*	-0.03	-0.11	-0.01	0.04	-0.02	-0.07	0.00
	[0.53]	[3.96]***	[0.35]	[0.90]	[0.41]	[0.95]	[0.29]
Total capital ratio *i,t-1*	-0.28	-0.10	-0.27	-0.20	-0.14	-0.04	0.06
	[1.83]*	[0.33]	[0.86]	[0.70]	[0.56]	[0.14]	[0.69]
Demand for loans *i,t-1*	-0.12	-0.07	-0.02	-0.02	-0.04	0.00	0.02
	[2.35]**	[2.44]**	[0.40]	[0.38]	[1.31]	[0.11]	[1.16]
Current account balance *i,t-1*	0.12	-0.17	-0.42	-0.35	-0.68	-0.25	0.00
	[0.20]	[0.32]	[1.78]*	[1.29]	[2.33]**	[0.96]	[0.02]
10 -year rate *i,t-1*	5.10	12.16	3.12	2.44	4.48	3.88	3.69
	[1.93]*	[3.77]***	[3.88]***	[2.11]**	[2.94]***	[1.72]*	[1.18]
GDP growth *i,t-1*	-1.53	-4.31	-0.42	-1.03	-0.26	0.04	-1.47
	[1.52]	[4.20]***	[0.72]	[1.70]*	[0.33]	[0.05]	[1.19]
Inflation *i,t-1*	8.28	-0.89	3.61	1.66	2.07	6.07	-1.41
	[3.22]***	[0.38]	[3.10]***	[2.07]**	[1.54]	[3.13]***	[0.66]
Lagged dependent *i,t-1*	0.43	0.37	0.51	0.51	0.44	0.53	0.23
	[6.61]***	[4.27]***	[7.86]***	[11.49]***	[4.87]***	[6.03]***	[2.28]**
Country fixed effects	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	no	no	no	no	no	no	no
# of observations	264	264	264	264	264	264	252
# of countries	12	12	12	12	12	12	12

Table 3 in the appendix shows the results of a GMM dynamic panel estimation where the dependent variable *lending conditions* (columns 1 and 2) is the net percentage of banks in each country reporting a tightening of credit standards in the Euro area Bank Lending Survey (BLS) for the approval of loans or credit lines to enterprises and households. They are the answers to Questions 1 and 8 of the BLS. The dependent variable *lending standards due to balance sheet factors* (columns 3 to 7) is the net percentage of banks reporting a tightening of credit standards in the BLS due to the factor in the headings (for business loans: all balance sheet factors, bank capital position, bank liquidity position and bank market financing. For mortgage loans: all balance sheet factors). They are the answers to Questions 2 and 9 of the BLS. The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. The interbank ratio and the total capital ratio are the medians by country of these measures from the sample of Euro area banks as reported in Bankscope. The demand for loans is the net percentage of banks answering in the BLS that the demand for business or mortgage loans has increased (Questions 4 and 13 of the BLS). The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. The 10-year rate is the long-term government bond interest rate in each country. GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2002:Q4-2008:Q3. The test statistics are in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are robust.

Appendix: Table 4 (without time fixed effects)

Impact of monetary policy on terms and conditions applied to loans

	Business Loans						Mortgage Loan					Margin on riskier loans	
	Margin on average loans	Margin on riskier loans	Size of the loan	Collateral requirement	Loan covenant	Maturity of the loan	Margin on average loans	Margin on riskier loans	Collateral requirement	Loan-to-Value ratio	Maturity of the loan	Business loans	Mortgage loans
	1	2	3	4	5	6	7	8	9	10	11	12	13
Taylor-rule residuals *i,t-1*	14.167	9.102	5.634	4.439	7.385	10.049	4.948	4.38	2.955	4.375	-0.561	8.354	4.102
	[3.93]***	[3.10]***	[2.59]***	[1.91]*	[2.60]***	[5.06]***	[1.72]*	[1.76]*	[2.28]**	[1.75]*	[0.24]	[3.24]***	[1.77]*
Interbank ratio *i,t-1*	0.084	0.054	0.03	0.036	0.084	0.093	-0.075	-0.072	-0.055	-0.087	-0.035	0.053	-0.041
	[1.09]	[1.40]	[1.04]	[1.27]	[1.45]	[1.25]	[2.04]**	[0.98]	[1.99]**	[1.22]	[0.80]	[1.47]	[0.60]
Total capital ratio *i,t-1*	-0.03	0.27	0.15	0.228	-0.08	0.26	-0.01	-0.34	0.14	-0.26	-0.298	0.218	-0.32
	[0.08]	[0.76]	[0.70]	[1.24]	[0.20]	[0.86]	[0.04]	[2.60]***	[2.20]**	[1.03]	[0.96]	[0.61]	[1.88]*
Demand for loans *i,t-1*	-0.03	-0.06	-0.04	-0.049	-0.11	-0.03	-0.06	-0.03	-0.03	-0.09	-0.101	0.009	-0.011
	[0.56]	[1.14]	[2.08]**	[0.84]	[2.47]**	[0.55]	[2.00]**	[0.84]	[1.24]	[3.83]***	[3.51]***	[0.20]	[0.27]
Current account balance *i,t-1*	-0.27	-0.48	-0.48	-0.566	-0.38	-0.22	0.41	0.28	0.07	0.04	-0.083	-0.402	0.262
	[0.78]	[1.33]	[2.36]**	[2.11]**	[0.98]	[0.60]	[0.46]	[0.84]	[0.24]	[0.15]	[0.21]	[1.22]	[0.90]
10 -year rate *i,t-1*	13.703	8.626	4.406	3.124	1.766	2.572	11.306	7.426	2.531	2.632	4.388	10.022	7.421
	[3.21]***	[2.66]***	[1.33]	[0.98]	[0.48]	[0.93]	[2.91]***	[2.42]**	[1.54]	[0.94]	[1.70]*	[3.19]***	[2.72]***
GDP growth *i,t-1*	-2.883	-2.659	-2.071	-0.117	-2.424	-1.602	-1.356	-1.936	-1.599	-2.821	0.855	-1.799	-1.289
	[2.10]**	[1.82]*	[2.09]**	[0.11]	[1.72]*	[2.22]**	[0.71]	[2.42]**	[2.92]***	[1.80]*	[1.15]	[0.99]	[1.25]
Inflation *i,t-1*	9.65	10.20	6.16	6.121	3.70	6.25	6.20	4.61	0.85	-2.14	2.379	9.115	4.438
	[3.49]***	[3.64]***	[3.39]***	[3.68]***	[1.92]*	[2.26]**	[2.20]**	[2.09]**	[1.30]	[1.49]	[1.94]*	[3.83]***	[2.09]**
General economic conditions *i,t-1*												0.153	0.111
												[2.48]**	[1.33]
Industry/firm outlook *i,t-1*												0.062	
												[0.71]	
Risk of collateral *i,t-1*												0.091	
												[0.71]	
Housing market prospects *i,t-1*													0.149
													[2.32]**
Lagged dependent *i,t-1*	0.487	0.39	0.439	0.618	0.422	0.406	0.517	0.494	0.379	0.443	0.24	0.238	0.381
	[9.16]***	[5.25]***	[4.71]***	[6.81]***	[4.55]***	[5.86]***	[6.29]***	[6.34]***	[4.96]***	[4.00]***	[3.73]***	[2.41]**	[7.71]***
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	no	no	no	no	no	no	no	no	no	no	no	no	no
# of observations	264	264	264	264	264	264	264	264	264	264	264	264	264
# of countries	12	12	12	12	12	12	12	12	12	12	12	12	12

Table 4 in the appendix shows the results of a GMM dynamic panel estimation where the dependent variable is the net percentage of banks in each country reporting a tightening of the terms and conditions for approving loans or credit lines to enterprises (columns 1 to 6) and to households for house purchase (columns 7 to 11) in the Euro area Bank Lending Survey (BLS). They are the answers to Questions 3 and 10 of the BLS. The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation over the period 2002:Q3-2008:Q2. The interbank ratio and the total capital ratio are the medians by country of these measures from the sample of Euro area banks as reported in Bankscope. The demand for loans is the net percentage of banks answering in the BLS that the demand for business or mortgage loans has increased (Questions 4 and 13 of the BLS). The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. The 10-year rate is the long-term government bond interest rate in each country. GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. In columns 12 and 13 the dependent variable is the net percentage of banks reporting a tightening of terms and conditions for riskier business and mortgage loans. In these regressions the additional controls are: the net percentage of banks reporting a tightening of credit standards due to general economic conditions, industry/firm outlook and risk of collateral (for business loans) and to housing market prospects and general economic conditions (for mortgage loans). These controls are the answers to Questions 2 and 9 of the BLS. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2002:Q4-2008:Q3. The test statistics are in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are robust.

Appendix: Table 5 (without time fixed effects)

Interaction between monetary policy, max Loan-to-value and capital stringency index (without time fixed effects)

	Mortgage loans			Business loans		
	Lending conditions	Balance sheet factors	Bank competition	Lending conditions	Bank capital position	Bank liquidity position
	1	2	3	4	5	6
Taylor-rule residuals i,t-1	-3.062	-24.309	-33.522	-2.084	12.802	22.109
	[0.10]	[1.04]	[1.72]*	[0.13]	[1.54]	[5.49]***
(TR-residual * max LTV) i,t-1	2.791	12.504	17.177			
	[0.19]	[1.15]	[1.83]*			
Capital stringency i,t-1				-25.34	8.52	39.00
				[0.76]	[0.51]	[3.37]***
(TR-residual * Capital stringency) i,t-1				8.66	-6.01	-11.91
				[0.87]	[1.10]	[4.48]***
Interbank ratio *i,t-1*	-0.073	0.01	-0.077	-0.031	0.027	-0.036
	[1.18]	[0.62]	[0.65]	[0.54]	[0.67]	[0.89]
Total capital ratio *i,t-1*	0.269	0.111	-0.215	-0.189	-0.245	-0.195
	[0.77]	[1.31]	[0.61]	[1.13]	[0.86]	[0.85]
Demand for loans *i,t-1*	-0.038	0.042	-0.05	0.016	-0.047	-0.023
	[0.48]	[2.42]**	[1.07]	[0.28]	[1.31]	[0.54]
10 -year rate *i,t-1*	9.527	3.494	7.771	5.854	2.789	5.674
	[3.20]***	[1.05]	[3.12]***	[2.05]**	[2.26]**	[3.70]***
Current account balance *i,t-1*	0.123	-0.038	0.337	0.188	-0.366	-0.638
	[0.18]	[0.25]	[0.59]	[0.28]	[1.37]	[2.54]**
GDP growth *i,t-1*	-6.156	-1.826	-3.751	-2.618	-0.605	-0.052
	[3.47]***	[1.32]	[2.90]***	[2.69]***	[1.26]	[0.09]
Inflation *i,t-1*	-3.553	-7.629	-12.601	4.698	3.947	7.406
	[0.37]	[1.00]	[2.00]**	[0.76]	[1.41]	[5.49]***
Lagged dependent i,t-1	0.305	0.144	0.305	0.457	0.508	0.414
	[3.41]***	[1.27]	[4.94]***	[6.27]***	[12.00]***	[4.63]***
Country fixed effects	yes	yes	yes	yes	yes	yes
Time fixed effects	no	no	no	no	no	no
# of observations	242	242	242	264	264	264
# of countries	11	11	11	12	12	12

Table 5 in the appendix shows the results of a GMM dynamic panel estimation where the dependent variable in columns 1 to 3 is the net percentage of banks in each country reporting a tightening of lending conditions and of lending standards due to balance sheet factors and bank competition for mortgage loans in the Euro area Bank Lending Survey (BLS). They are the answers to Questions 8 and 9 of the BLS. In columns 4 to 6 the dependent variable is the net percentage of banks reporting a tightening of lending conditions and of lending standards due to bank capital and bank liquidity position for business loans in the BLS. They are the answers to Questions 1 and 2 of the BLS. The max LTV is the maximum Loan-to-Value ratio applied to mortgage loans in each country as reported in IMF (2011). Capital stringency is an index of stringency of capital requirements (Barth, Caprio and Levine 2006). The Taylor-rule residuals are the residuals of the regression of EONIA rates on GDP growth and inflation. The interbank ratios and the total capital ratios are the median of these measures from the sample of Euro area banks as reported in Bankscope. The 10-year rate is the long-term government bond interest rate in each country. The current account balance is the current account surplus/deficits for each euro area country divided by nominal GDP. The demand for loans is the net percentage of banks that have answered that the demand for business or mortgage loans has increased (Question 4 and 13 of the BLS). GDP growth is the annual growth rate of real GDP for each country. Inflation is the quarterly average of inflation rates for each country. All the explanatory variables are lagged by one quarter. The panel includes data for 12 euro area countries (Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The panel regressions are estimated over the period 2002:Q4-2008:Q3. The test statistics are in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are robust.