Anxious periods and bank lending

by

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Abstract.

Using a number of theoretical considerations, we define anxiety periods on the basis of whether the confidence of different economic agents that are involved in lending decisions (i.e. consumers, CEOs or banks themselves) is hurt. The main characteristic of anxiety periods in our setting is that the confidence of economic agents falls, but the economy is not in a recession and it may or may not fall into one. Subsequently, we study the lending behavior of US banks over the anxious periods. We find that bank lending falls primarily with consumers' or banks' anxiety, as well as when banks hold a high level of risk in their portfolios. We also find significant differentiation of bank lending within anxious periods for large banks. Finally, we show that before the recession of 2008-2009, loan growth in fact accelerated, even though this is the only period when consumers, CEOs and banks were simultaneously anxious.

***JEL classification*:** G21; E44; E32; D22

***Keywords*:** Bank lending; Anxious periods; Consumer confidence; CEO confidence; Bank confidence

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1. Introduction

Banks' lending activity is affected by the state of the economy today and expectations about the future states. Changes in expectations can cause credit cycles, namely fluctuations in credit and leverage that affect the path of the economy. These fluctuations range from expansions, when bank lending increases and risk aversion decreases, to contractions, when lending deteriorates and risk preferences shift to safer assets. The financial turmoil that started in 2007 and led to a panic in the fall of 2008 reveals the importance of bank lending behavior in the formation of the developments and the reinforcement of the crisis. More specifically, the lending decisions of banks during specific periods, when economic agents are less confident but the economy is not in a recession, may either ease this anxiety or impose further strain on confidence and throw the economy into recession. How can these phases of economic anxiety be defined explicitly from the data and how is bank lending shaped during such phases? What are the implications of the lending behavior of banks during these anxiety periods for the development or not of a crisis? Our paper aims to provide some answers to these questions.

We borrow the discussion on anxious periods from Fostel and Geanakoplos (2008), who define three states of the economy, i.e., good, anxious and bad, to explain the frequently observed high volatilities in emerging asset classes. In this context, anxious states are intermediate phases of the economy related to bad news and characterized by increased uncertainty and heterogeneity, i.e., difference of opinion, between agents. The anxious states may be followed by a crisis (recession) or, as in most cases, the economy will go back to the good state. Here, we place this concept of anxiety within a real-economy setting and bring financial intermediaries explicitly into the picture (see Shin, 2009). In our framework, there are three main players in the

economy that affect lending decisions: households, firms and, of course, banks themselves. Households and firms are the main creditors of the banking system as depositors, and banks make lending decisions using this line of credit along with own assets. Thus, these three agents' interrelated expectations on economic outcomes shape the economic landscape and the informational structure about the economy, and may exert significant influence on the lending volume.

Even though expectations of households, firms and banks are interrelated, these agents may still be anxious during different times, on the basis of their own asymmetric goals, strategies and expectations. This heterogeneity complicates the explicit identification in the data of an anxious state of the economy. Thus, we do not use a universal measure of anxiety for all economic agents, but rather resort to a single measure for each economic agent. In particular, we use three indices that characterize explicitly consumer, CEO (firm) and bank confidence and define anxiety periods on the basis of these metrics for each agent. Subsequently, we identify how bank lending evolves during the anxiety periods using bank-level data from the Y-9C call reports over the 1985Q1-2010Q2 period.

Our results indicate that bank lending responds differently to the anxiety of consumers, CEOs and banks; however the response has a common denominator, namely credit risk. In particular, an increase in consumer and bank anxiety yields a drop in total loan supply growth for banks with a higher level of problem loans. Other bank characteristics, such as capitalization and liquidity do not drive the lending decisions of banks in anxious periods. In general, it seems that bank lending behavior is affected primarily by the anxiety of consumers and banks themselves, both of which are clearly procyclical. In contrast, loan growth is less sensitive to CEO confidence, even the growth of certain loan categories passes through provisioning

decisions of banks. In addition, there is evidence that large banks tend to react more than smaller ones to the signs of anxiety.

The role of banks as liquidity providers is extensively examined in the literature (e.g. Bernanke and Gertler, 1989, 1995; Hölmstrom and Tirole, 1997; Diamond and Rajan, 2001; Kashyap and Stein, 2000). More recently, Becker and Ivashina (2010) document the cyclical behavior and the importance of bank credit supply for the business cycle. Several studies focus on the transmission of shocks during, or at the onset of recessions (e.g., Bernanke et al., 1996). Others examine the effect of exogenous shocks to bank credit supply, providing evidence on its' impact and importance on firms' activity (e.g. Peek and Rosengren, 2000; Chava and Purnanandam, 2011). Ivashina and Scharfstein (2010) look at the evolution of bank lending in the US during the recent financial crisis.

Clearly, our study deviates from previous ones in that we aim to explore the bank lending behavior during anxious periods of the economy that may or (in most of the times) may not lead to crises (recessions). This modeling framework has a number of important advantages. First, the fact that not all economic slowdowns or declines in agents' optimism are followed by recessions may suggest a special role for the lending behavior of banks in the actual subsequent developments in the economy. In other words, it may be that the differential actions of banks across different anxious periods are responsible for the passing or not from the anxious to the bad state. Second, the framework provides an optimal strategy to examine whether a herding-type of bank behavior prevails during anxious and/or bad times of the economy. Or, it allows examining whether the more important, large banks follow different strategies, owing to moral hazard issues associated with too-big-to-fail concerns of governments, regulators and the public. In other words, we offer some insights on bank competition

during anxious times of the economy. Given all of the above, it is important to investigate the lending behavior of banks when anxiety stems from different agents in the economy and shed some light not only to the term horizon of banks, when things in the economy get worse, but also to the possible similarities in bank lending activity during anxious periods and recessions.

The rest of the paper is organized as follows: Section 2 discusses the concept of anxious and bad times of the economy. Also, in this section we survey the literature on households and firms' expectations and their relation to the economy, as well banks' lending standards over the business cycle. Section 3 describes the data and the identification strategy of the anxious phases of the economy, while Section 4 discusses the empirical methodology. Section 5 presents and discusses the empirical results and Section 6 concludes the paper.

2. Anxious and bad times of the economy

As mentioned in the introduction, we borrow from the discussion on the three states of the economy, i.e., good, anxious and bad, from Fostel and Geneakoplos (2008), but we place it within a real economy setting. We define as bad times the recession periods as classified from NBER and use them as a benchmark for the behavior of banks' lending activity against anxious periods. Thus, the definition of bad times is uniform across economic agents. The period examined encompasses three recession periods – 1990Q3-1991Q1, 2001Q2-2001Q4 and 2008Q1-2009Q2.

Defining anxious periods is a more corplex issue. As Fostel and Geanakoplos (2008) argue, anxious periods emerge at the onset of bad news, are characterized by increased uncertainty and heterogeneity, i.e., difference of opinion, between agents and evolve much more often to normal periods than to crises – recessions in our

framework. However, they develop this concept within a market's perspective where all agents, i.e., market participants, observe the price of the asset(s) and have a common decision to make: whether they would buy or sell. Put it differently, the price of the asset(s) serves the role of a uniform and observable from all signaling device for judging the current condition of the market. Then, depending on each participant's perceptions and expectations about the future, they act accordingly. However, such a common across all agents signaling device is generally absent in a real economy setting. As Bernanke and Boivin (2003) observe, central banks, as well as the Federal Reserve, monitor and analyze a vast number of data for judging the current status of the economy in order to conduct monetary policy.

The issue of defining anxious periods is further perplexed by the fact that different economic agents may look into different economic outcomes. For example, a restructuring of the tax system towards higher personal income and lower corporate taxation would improve firms' appraisal for future economic conditions and worsen households' perception about future income. On the other hand, households are in general more concerned with unemployment or inflation. The presence of informational asymmetries between firms and households adds to this heterogeneity in perceptions. Firms' managers are generally better informed about the prospects of the economy than households, since they focus on investment prospects and future profitability, which are affected by a large number of factors. To this end, businessmen have better access, as part of their business, and possibly better understanding of economic news and analyses. Thus, firms' CEOs can rate in advance of households current and future economic prospects. This antecedence of firms' CEOs over households in reacting to economic signals is verified by Bachman and

Sims (2010) who point that CEO confidence reacts much more quickly to a policy shock than consumer confidence does.

However, both firms and households' beliefs and expectations play a crucial role for economic activity. Lorenzoni (2009) provides a robust theoretical justification for the role of expectations on short-run economic fluctuations. In addition, these two groups of agents are the main customers of banks both as credit receivers as well as depositors. Yet, banks also have their view about current and future economic conditions, which determines their lending strategy and may not, at least in principle, coincide with those of firms and households. To put it differently, it may be the case that firms, households and banks do not share the same beliefs at a certain point in time about the economy and its prospects.

All in all, we need to identify indices that capture households', firms' and banks' perceptions and expectations regarding the state of the economy, and also have an impact on the status of the economy. The consumers' and CEOs' confidence, and banks' lending standards serve both these roles. For our purposes, and since our focus is on the anxious periods of the economy we proxy anxiety either from the consumers or the firms' CEOs point of view with falling confidence. From the banks' point of view we proxy anxiety about current condition and the prospects of the economy with rising lending standards. Details on the rule employed for the identification of anxious periods are provided in Section 3.

2.1. Confidence and the economy

In the literature, the role of confidence in the economy ranges from definitely important regarding both causal and/or forecasting purposes (Keynes, 1936; Blanchard, 1993; Ackerlof and Shiller, 2009), to just being an information provider

for the future state of the economy. In the latter view, economic agents observe aggregate macroeconomic measures and, based on them, form their perceptions about the true fundamentals and make their beliefs about future states of the economy (Cochrane, 1994; Barsky and Sims, 2010; Bachman and Sims, 2010). According to Bachman and Sims (2010), another explanation for confidence's role, which is more closely related to the spirit of Fostel and Geanakoplos (2008), is that it can be seen as a time-varying discount factor for the future states of the economy. For our purposes, confidence serves as a proxy not only for the expectations of economic agents about the future state of the economy, but also as a predictor for macroeconomic activity.

A large literature examines the effect of changes in consumer confidence to macroeconomic variables. Indicatively, Carroll et al. (1994) show that lagged values of consumer confidence explains about 14% of the one quarter ahead variation in total consumption expenditure growth, while it contains additional information about future changes in consumer spending. Matsusaka and Sbordonne (1995) show that changes in consumer confidence Granger-cause changes in economic aggregates. Ludvigson (2004) concludes that consumer confidence contains information about the future consumer expenditure growth and reflects expectations for income and non-stock market wealth growth. Hu and Phillips (2004) model the dynamics of the federal funds target rate and find that consumer confidence, together with inflation, plays a prominent role in Fed's intervention decisions. Lemmon and Portniaguina (2006) find that consumer confidence has predictive ability for small stocks' returns and future macroeconomic activity. Interestingly, they point out that this ability has emerged during the last three decades, with consumer confidence becoming a much better barometer of economic activity and investors' attitudes. Barsky and Sims (2010) show that innovations of consumer confidence have significant and long

lasting effects on consumption and output which are much larger at long horizons than at short ones. Moreover, and perhaps more importantly for our case, they find that income or consumption do not highly Granger-cause consumer confidence, while innovations of these variables are not highly correlated with innovations in consumer confidence.

The vast majority in the aforementioned literature focus on consumers' confidence. As rare exceptions, Medoff and Sellers (2004) document the strong relation between CEO confidence and both total level of investment relative to cash and real interest rates. More recently, Bachman and Sims (2010) find that both consumer and CEO confidence play a modest role in the transmission of policy shocks into the economy. Their results indicate that confidence is more important for the transmission of monetary and tax than fiscal shocks, while CEO confidence, as opposite to consumer confidence, plays a more essential role to this propagation, responding earlier and by more to these shocks.

2.2. Bank lending decisions and anxious times

The stylized facts that leverage and credit are procyclical have yielded in a growing number of studies that examine credit cycles and their relation to the business cycle. Bernanke and Gertler (1989) argue that as the economy worsens, firms' net worth decreases, banks' agency costs increase and thus, loan volume deteriorates while interest rates on new loans rise. Rajan (1994) attributes the observed countercyclical variation in lending standards, and thus credit, across the business cycle to banks managers' short term interest and reputation considerations. Berger and Udell (2004) argue that this is due to the bank managers' growing – as the business cycle evolves – inability to identify potential borrower's problems.

Ruckes (2004) show how changes in the quality of borrowers over the business cycle affect banks' lending standards. His model predicts that banks' effort in the screening of potential borrowers exhibits an inverse U-shape as a function of economic prospects. Intuitively, during periods of high uncertainty about future economic prospects, i.e., anxious periods in our framework, banks increase their screening effort because the production of information is more profitable. Moreover, screening intensity varies with loan applicant's sector, being high in industries with more uncertain prospects. According to Ruckes (2004), banks are also concerned with the winner's curse effect, i.e., adverse selection, which during bad times may make them to deteriorate lending.

Dell'Ariccia and Marquez (2006) examine banks' strategic behavior in credit screening and lending decisions, which interacts with the distribution of information about borrowers across banks. Information asymmetry across banks moves in the same direction with lending standards as private information obtained by banks about firms during booms is little while lending standards are eased. Through this channel macroeconomic shocks may be transmitted to the banking system and threaten systemic stability. Furthermore, they show that the effect on banks' lending behavior is the same either through credit screening or collateral requirements.

More recently, Gorton and He (2008) attribute periodic credit crunches to banks' strategic competition for borrowers. As they argue, banks lending decisions are conducted through lending standards rather than loan price, are driven by rival banks' lending activity and performance and create endogenous credit cycles. They provide empirical evidence in favor of their model predictions and show that banks' relative performance of commercial and industrial loans is an autonomous part of macroeconomic dynamics.

On the empirical front, Asea and Blomberg (1998) and Berger and Udell (2004) provide evidence that are in line with the above theoretical predictions. Lown *et al*. (2000) show that banks' lending standards are highly (negatively) correlated with aggregate loan growth and economic activity. Lown and Morgan (2006) document that lending standards are superior than interest rates in explaining economic fluctuations, while shocks to the monetary policy rate do not cause changes in standards – the opposite is true. However, they point out that a tightening in banks' lending standards may just reflect, rather than cause through loan supply, a worsening in economic conditions. Lown and Morgan (2006) also show that a part of lending standards' variation is related to changes in loan supply, rather than demand, while they find weak evidence of a negative link between banks' capital ratios and lending standards.

As the majority of this literature stress, banking problems and financial instability originate in boom times. However, as the economy gets into anxious periods uncertainty increases and the quality of borrowers deteriorates. The same is true for the asymmetric information across banks, as the value of public information reduces, and banks' screening effort increases (Ruckes, 2004; Dell'Ariccia and Marquez, 2006). These effects may be exacerbated by the strategic competition between banks (Gorton and He, 2008). All the above point to a reduction in lending during anxious periods, caused either by changing lending behavior of banks towards different loan categories or by increased collateral requirements on new loans or both.

Yet, bank past loan portfolios are not easily restructured. Moreover, bank characteristics that reflect past bank behavior in asset management probably also play their role. For example, lax lending behavior of banks during good times of the economy may put a considerable burden on banks' credit risk during anxious times,

and thus affect their lending decisions. A low liquidity position or capitalization of banks may also put additional weight on institutions. As banks aim to deleverage their balance sheets during anxious periods, and in the case this happens simultaneously, this may cause systemic stress through a liquidity crunch and threaten financial stability (Adrian and Shin, 2008).

3. Data description and identification of anxious periods.

Table 1 contains a comprehensive report on the variables employed in the empirical analysis, the way these variables are measured and the data sources. Data on the bank-level variables come from the Y-9C call reports. The Y-9C call reports provide financial account data for all commercial banks that are regulated by the Federal Deposit Insurance Corporation on a quarterly basis. We use data on all available commercial banks for the period 1985Q1-2010Q2. This yields an unbalanced panel of 1,116,397 bank-quarter observations. From these, we calculated for each bank the following variables: capitalization, size, efficiency, non-performing loans, liquidity and the lending rate. For the exact measures, see Table 1.

Insert Table 1 here

The macroeconomic variables come from Datastream. We obtain data for the volume of industrial production and the Conference Board's consumer confidence and CEO confidence measures. Data on the industrial production and consumer confidence variables are seasonally adjusted. Industrial production serves as a control for the general macroeconomic conditions that affect all banks in the sample. Below we

discuss in more detail the three core variables of our study, pertaining to the confidence of economic agents.

The Conference Board's Consumer Confidence Survey is conducted monthly on a representative sample of 5,000 households with response rate of about 70%. There are five questions in the survey concerning the appraisal of current (i) business and (ii) employment conditions, and expectations regarding (iii) business and (iv) employment conditions, as well as (v) total family income in a six-month horizon. There are three available responses to each of these questions: positive, negative and neutral. For each question, after seasonally adjustment for the response rate, one sub-index value is calculated as the ratio of positive answers to the sum of neutral and negative ones, relatively to the relevant ratio for the calendar year 1985. The consumer confidence index is then calculated as the average of all five sub-indices.

In turn, the CEO survey is conducted quarterly with a sample of 100 CEOs from ten industrial sectors that span the economic activity of the country. The sectors include manufacturing of durable and non-durables goods, as well services. The survey involves four questions regarding the appraisal of current (i) economic conditions, (ii) conditions in the specific industry each CEO belongs to compared to that six months ago, and expectations about (iii) the economy and (iv) the specific industry in a six-month horizon. The available answers are classified as substantially better, moderately better, same, not substantially better and substantially worse, each taking the numerical value 100, 75, 50, 25 and 0, respectively. Then, the value of the CEO confidence index is calculated as the average of the values of the answers, resulting in a number in the [0, 100] interval.

Lastly, we proxy banks' confidence in economic prospects with the index of banks' terms of credit for commercial and industrial loans to large and medium firms.

These data (available from 1990Q2 onwards) come from the Senior Loan Officer Opinion Survey on bank lending practices. The survey is conducted quarterly from the Federal Reserve on a panel of 60 large domestic banks and up to 24 branches of foreign banks. Its' main purpose is to provide qualitative information on credit-market and lending conditions in the US. The survey covers banks from all Federal Reserve Districts and is heavily weighted towards large banks, in order to capture the development and implementation of new banking techniques. The index of banks' terms of credit is measured as the ratio of respondents reporting tightening during the previous quarter minus those who report easing standards to the sum of respondents.

To control for the regulatory changes that took place in the U.S. banking industry during the period examined, and possibly affected the credit supply behavior of banks, we construct two dummy variables. The first takes a value 1 from 1989Q3 onwards to capture the effect of the "Financial Institutions Reform and Recovery Act", enacted on August 9, 1989. The second takes a value 1 from 1994Q4 onwards to capture the effect of the "Riegle-Neal Interstate Banking and Branching Efficiency Act", enacted on September 29, 1994. Although the number of regulatory changes was vast during the period examined (Sherman, 2009), our preliminary results point to the inclusion in the analysis of just these two dummies.

Table 2 reports descriptive statistics for the variables employed. We report the number of observations available for each variable, along with the mean, standard deviation, minimum and maximum values. Also, Table 3 presents the correlation matrix of the variables.

Insert Tables 2 and 3 here

Interestingly, the correlation coefficient between consumer and CEO confidence takes a value of -0.03, indicating that the two measures of confidence are uncorrelated. However, the correlation coefficient between the differences of the (log) consumer and CEO confidences is equal to 0.5, suggesting that firms and households do not react contemporaneously and/or in the same direction to the arrival of news. This is in line with the discussion in Section 2 about the heterogeneity of perceptions and expectations about the economy between firms and households. Moreover, this pattern is consistent with the finding of Bachman and Sims (2010) on the earlier response of CEO confidence to shocks related to consumer confidence.

Figure 1 pictures the time evolution of the three confidence indices, together with industrial production volume.

Insert Figure 1 here

Consumer confidence clearly exhibits a procyclical behavior. In contrast, CEO confidence increases substantially in periods shortly after a recession ends or even when expectations suggest that the recession is ending. Moreover, falling periods for consumer confidence do not in general coincide with falling periods for CEO confidence. Another point worth mentioning is that consumer confidence has larger swings than CEO confidence, but the latter exhibits a greater number of small ups and downs around its short run trend. As for bank anxiety, it starts rising right before recession periods and exhibits a peak during them, the only exception being at the 2001 recession where it peaked about one quarter before the event.

3.1. Identification of anxious periods.

As already mentioned, we proxy consumers' and CEOs' anxiety with falling confidence. As for banks, in contrast to the consumers and CEOs' confidence indices, a higher value on banks' terms of credit reflects higher banks' anxiety.

We define anxious periods from each economic agent's perspective, i.e., households, firms and banks, using a heuristic approach. Thus, three distinct pools of quarters characterized by anxiety for consumers, CEOs or banks are obtained. In particular, for each of the three economic agents anxious periods are defined as a two consecutive quarter decline in the value of the variable measuring the confidence of the respective agent, while the economy is not in a recession. For banks, this rule applies from 1990Q2 onwards where data is available. This approach yields 18 quarters of anxiety for consumers and CEOs, out of which only 4 quarters are common between the two. These are 1993Q3, 2005Q3 and 2007Q3-2007Q4. As for banks, 14 quarters of anxiety are identified. Only for 5 of them consumers were also anxious, while the relevant number of common anxiety for both firms and banks is 3 quarters. These figures justify our approach to examine anxiety from the three different economic agents' perspective. Interestingly, only for one quarter all agents were simultaneously anxious – 2007Q4.

To examine the sensitivity of our results, we also employ a second rule. Specifically, we define as anxious periods those in which each agent's confidence has been falling for one quarter and at the same time it is lower than their sample average mean, while the economy is not in a recession. This second rule yields 19 quarters of anxiety for consumers, 13 for CEOs and 9 for banks. From these, only for two quarters both consumers and CEOs were anxious, 1996Q1 and 2007Q4, while again 2007Q4 is the only quarter in which all three agents were anxious.

Figures 2 to 4 illustrate the anxious periods for consumers, CEOs and banks, respectively, using the first rule. Anxious periods are shaded in blue and recession periods in grey. Evidently, consumer anxiety periods always precede recession periods (see Figure 2). In contrast, Figure 3 shows that CEOs were anxious only before the 2008 recession. Finally, banks, for which data starts at 1990Q2, were anxious before both the 2001 and 2008 recessions.

Insert Figures 2, 3 and 4 here

4. Empirical methodology

The empirical strategy builds on the literature involving bank lending equations. Kashyap and Stein (2000), and many others henceforth, show how to overcome a number of identification problems when examining the existence of a bank-lending channel of monetary policy. Their proposed strategy involves disentangling the effect of macroeconomic variables on loan supply from the respective effect of these variables on loan demand (simultaneity problem). To this end, this literature proposes using bank-level data and interaction effects between certain individual bank characteristics and the macroeconomic determinants of lending. This provides a reduced-form equation with the capability of identifying shifts in loan supply.

In addition, Kashyap and Stein (2000) suggest a solution to the so-called endogeneity problem. In particular, the use of relatively high frequency data, i.e. quarterly data, allows examining the lending behavior of banks when these banks view the state of the economy and elements of their own portfolio as predetermined. In other words, banks make lending decisions on the basis, *inter alia*, of the behavior

of other economic agents, the state of the economy and the strength of their balance sheet in the previous quarter. Obviously, this strategy substantially eases concerns on reverse causality issues. Further sensitivity analysis is carried out on this front below.

The actual empirical model to be estimated is of the following form:

$$\Delta \ln(loans)_{it} = a_0 + a_1 \Delta \ln(loans)_{i,t-1} + \sum_i a_{2i} B_{i,t-4} + a_3 \Delta S_{t-1} + \sum_i a_{4i} B_{i,t-4} * \Delta S_{t-1} + a_5 \Delta \ln M_{t-1} + u_{it} \quad (1)$$

where loan growth over the previous quarter is regressed on its lag, a number of bank characteristics *B* observed over the previous year, the change in the anxiety indices *S* (in natural logarithm for consumers and CEOs) between time *t*-1 and *t*-2, the interaction of these anxiety indices with bank characteristics and the change in the macroeconomic conditions *M* between time *t*-1 and *t*-2.

Evidently, we deviate from the literature on the bank-lending channel of monetary policy in a number of ways. First and foremost, each equation is estimated (unless otherwise specified) only for the three pools of quarters, when the three different economic agents are anxious. This choice provides a clear-cut answer to how banks respond to the state of anxiety, when this anxiety may stem from different agents affecting lending decisions.

Second, on more technical grounds, we do not include many time lags on the dependent and explanatory variables (the literature using quarterly data tends to include four time lags). The main reason for this choice is that multicollinearity of the lags tends to affect inference heavily. Instead, we assume that banks observe the developments in the previous quarter and, in conjunction with the strength of their balance sheets relative to the same quarter of the previous year, they decide whether and by how much they will expand lending.

Third, note that we include the fourth lag, i.e., annual, of the variables characterizing the strength of bank balance sheets. The reason is that data on bank characteristics, such as liquidity and capitalization, are highly seasonal, owing to accounting practices used by banks. A correction for this type of seasonality in terms of sophisticated econometric methods finds no consensus in the literature. Thus, it seems quite safer to assume that banks decide to expand their lending based on the information they have on the position of their balance sheet strength over the same quarter of the previous year.[1]

Fourth, here we do not focus on the identification of a bank lending channel of monetary policy and, thus, there is no need to include a policy interest rate among the regressors. This provides additional flexibility to our model because there is no consensus on what the proper monetary policy instrument should be. Since we are more concerned with identification, we make Eq. (1) a *de facto* bank loan supply equation, by including the bank-level lending rate among the explanatory variables. This choice further eases concerns on the simultaneity problem described above, as this variable is observed at the bank level. However, we do provide some sensitivity analysis of the results when including the federal funds rate. All in all, we feel that the above assumptions represent a quite accurate approximation of bank behavior.

Regarding the estimation of Eq. (1), the literature proposes using either an endogenous panel data estimation method or GMM for dynamic panels. The latter method seems to be the most favored in recent studies (see e.g. Gambacorta, 2008; Altunbas et al., 2010). Yet, in panels with a relatively large time dimension as in our case, the number of instruments under GMM gets very large. The quality of these instruments is often poor because they tend to be only weakly correlated with first-

[1] In fact, this is exactly what bank managers tend to do when carrying out the so-called CAMEL (Capital Adequacy, Assets, Management Quality, Earnings and Liability measurement) analysis.

differenced endogenous variables that appear in the equation. This leads to a large bias under GMM estimation, and state of the art econometrics for dynamic panels suggests using limited information maximum likelihood (see Baltagi, 2005, pp. 153, and references therein). In the empirical analysis below we primarily follow this suggestion and we conduct some sensitivity analysis by using GMM.

5. Empirical results

This section reports and discusses the empirical results of the paper. First, we present the findings on the response of total loan growth to the anxiety of consumers, CEOs and banks, respectively. Second, we examine the same effect on individual loan categories, i.e., loans to individuals, consumer and industrial loans, and loans secured by real estate. Third, we identify the behavior of only large and very large banks. Finally, we conduct several robustness exercises to ensure that results are not driven by the key assumptions made on the empirical strategy and the set of variables employed.

5.1. Total loan growth during anxious periods

Table 4 reports the results on the rate of change of total loans. Columns I to VI report the results when the different economic agents are anxious, while columns VII to IX the results for the recession periods. Columns I, III and V show the results with anxious periods defined with our first rule, i.e., two consecutive quarters decline in the confidence of consumers, CEOs and banks, respectively and the economy not being in a recession. Columns II, IV and VI report the respective results with anxious periods defined with our second rule, i.e., one quarter decline in confidence and the respective variable being below (above for bank confidence) its sample mean and the

economy not being in a recession. All specifications include a set of bank-level, macroeconomic and regulatory variables, as defined in Section 4. For expositional brevity, and since we are interested on the interaction effects that characterize loan supply, estimation results of the main terms are not reported for all estimated equations.[2] For the baseline regressions, we report and discuss the results of the main effects in the Appendix. Note that, by definition, anxious periods for consumers and CEOs are characterized by falling confidence, i.e., the change in confidence is always negative. In contrast, for banks the change in the terms of credit, used as a proxy for banks' anxiety, is always positive. Therefore, for illustrative convenience, we convert the sign of changes in consumer and CEO confidence in anxious periods from negative to positive so that the results will read in a uniform manner across all anxious agents. Thus, a positive (negative) coefficient of the interaction terms with the anxious variables for the three agents should be interpreted as having a positive (negative) impact on the dependent variable.

A first interesting finding is that bank lending responds differently to the anxiety of different agents. However, the response has a common denominator, namely credit risk. More specifically, in columns I and II the coefficients of the interactions between consumers' anxiety and problem loans and provisions are negative and significant, the former being much larger in absolute terns than the latter (coefficients/t-statistics: -1.226/-3.256 and -0.112/-2.685, respectively). This finding shows that an increase in consumers' anxiety yields a drop in total loan supply growth for banks with higher problem loans and less so for these with higher provisions. In columns III and IV, the results show that banks do not alter their lending according to

[2] The impact of the main effect of an explanatory variable, in models with interaction effects, is sometimes misinterpreted as the "direct effect" of this variable on the dependent variable. This is clearly incorrect and further calculations should be carried out to identify the true direct effect (see Wooldridge, 2002, pp. 190-191, and discussion the Appendix).

CEOs' anxiety. Problem loans – an ex post proxy for credit risk – is also the key mechanism that leads to a decrease in lending growth when banks are anxious themselves, irrespective of the rule with which we define bank anxiety. Indeed, in column V the coefficient/t-statistic is -1.847/-2.834 for the interaction term of bank anxiety with problem loans, while the relevant coefficient for provisions is positive and significant. The same holds for the results in column VI. This finding is in accordance with Dell'Ariccia and Marquez (2006) and Gorton and He's (2008) theoretical predictions about the impact of bank competition on the lending behavior of banks.

In a nutshell, and given the fact that consumer and bank confidence are more or less procyclical while CEO confidence is not (see Figure 1) it seems that bank lending behavior is affected by anxiety that follows more closely in time the business cycle. This could be thought of as a rational behavior, as banks respond only when they expect that they will be facing problems in the near future, a finding consistent with Rajan's (1994) theoretical prediction about banks' short term interest. However, the fact that banks do not respond when their bigger customers, i.e., large firms, are anxious, shows that they neglect an indicator – CEO confidence – which responds earlier and more profoundly than consumer confidence to shocks (Bachman and Sims, 2010). Yet, this may have a serious effect on the health of bank portfolios in the medium term. Moreover, the above results verify the argument made by many prominent scholars that potential banking problems originate when the prospects of the economy are good during which problem loans and provisions are accumulated.

In columns I to IV, the rest of the multiplicative terms come out insignificant. This shows that bank characteristics such as capitalization, liquidity and size are not driving the lending decisions of banks in anxious periods. More interestingly though

an exception is bank size when banks are anxious (see columns V and VI). In fact, the positive and significant coefficient of the multiplicative term between bank anxiety and size is consistent with a moral hazard mechanism for banks. Intuitively, bank anxiety, i.e., tightening of credit standards, triggers intensified competition between larger banks in credit supply growth. It may be the case that larger banks respond by shifting to more risky projects in search for yield. This mechanism was first proposed by Keeley (1990) and will be further analyzed below where we examine the behavior of large and very large banks (recall that the bank anxiety index was constructed on the basis of large banks). Here we should note that this sort of banking behavior during anxious periods could be a recipe for a banking crisis when things in the economy become worse than expected and, thus, the passing from an anxiety to a recession period.

Finally, columns VII to IX report the results for the recession periods, when the anxiety variables from the consumers', CEOs' and banks' perspective, respectively are employed. One main difference from the results in anxious periods is that now the interaction term with bank liquidity turns out significant with a negative sign in all cases. This finding stresses the importance of injecting liquidity into the financial system during recessions. Problem loans still impact banks' lending behavior, however the relevant coefficient is much smaller in absolute terms than during anxious periods. This counterintuitive at a first glance result may reflect that banks have being prepared, i.e., cleansed their balance sheet, for the more stressed economic conditions of a recession during the precedent anxious time(s). Or, with equal outcome, it may be the case that the worst case scenario has been materialized and banks look forward to better economic prospects with the end of the recession. Lastly, the coefficients on the interaction between anxiety and bank size are positive

and significant in all cases. This implies that during recessions the supply loan growth and thus, the funding of the economy comes from larger banks only.

5.2. Different loan categories during anxious periods

Table 5 reports the results for the different loan categories. For expositional brevity, only the results with the first rule of anxiety are reported, i.e., when anxious periods are defined as two consecutive quarters decline in confidence and the economy is not in a recession. A first interesting finding is that an increase in anxiety for consumers, CEOs and banks does not have the same impact across all loan categories, nor banks behave in a consistent manner depending on their characteristics.

In particular, as regards loans to individuals and households (see Panel A of Table 5), higher consumer anxiety is associated with a fall in the growth of this loan category from banks with higher capitalization and problem loans. Specifically, the coefficients/t-statistics, reported in column I are -0.392/-1.903 and -1.794/-2.784, respectively. This finding is consistent with that for total loans. A more complicated picture emerges when CEOs are anxious. An increase in firms' anxiety drives banks with higher levels of problem loans to give out more loans to individuals and households. This finding is consistent with Ruckes' (2004) prediction about the different screening effort of bank depending in the prospects of each industry. Yet, an opposite effect emerges for banks with a high level of provisions. At a first glance this result is counterintuitive, yet, it may be explained by the fact that CEO confidence does not exhibit a procyclical behavior. Thus, banks bearing a higher credit risk in their portfolios, i.e., have a higher share of problem loans, increase their exposure to individuals and households – viewed presumably as more safe at the time – in an

effort to improve their credit risk profile. In contrast, more risk-averse banks, i.e., those with higher provisions, follow a more conservative strategy by reducing their exposure to this loan category. Lastly, when banks are anxious, loans to individuals and households increase for banks with higher provisions, providing evidence for increased competition for this loan category among more conservative banks, but are reduced for larger banks.

The results for commercial and industrial loans are reported in Panel B of Table 5. Interestingly, only provisions among all bank characteristics drive the lending decisions of banks for this loan category during anxious periods. Indeed, as consumers get more anxious, commercial and industrial loan growth decreases for banks with higher provisions (coefficient/t-statistic: -0.268/-7.239). The same holds for CEO anxiety, albeit at a much lesser extent. The bigger decrease in the growth for this type of loans comes when banks' anxiety increases from institutions with higher provisions (coefficient/t-statistic: -0.905/-2.375). These findings suggest that increasing anxiety of banks – tightening terms of credit – results for commercial and industrial loans to be seen more risky than the other traditional loan categories. Evidently, for more conservative banks the expected credit risk, proxyied by banks' provisions, weighs more in their lending decisions.

Finally, we report the results for loans secured by real estate in Panel C of Table 5. A common finding for this loan category is that banks, except for larger ones, consider, or used to consider until the recent crisis, this type of loans as safe. Indeed, when consumers are becoming more anxious, banks with higher provisions increase their exposure to such loans (coefficient/t-statistic: 0.020/1.837). The same is true for CEOs' anxiety. In this case however, larger banks follow a reverse path and decrease

the supply growth of these loans. Strikingly, when banks themselves are anxious they do not change their lending strategy regarding this loan category.

For brevity, the results for the loan categories during the recession periods are not reported here but are available upon request. An interesting finding which holds for both total loans (Table 4) and the different loan categories growth (Table 5) is that the statistically significant terms during anxious periods, are, in general, also significant during recession periods.

5.3. Total loan growth during anxious periods for large and very large banks

Table 6 reports the results for the supply of total loan growth for large and very large banks, i.e., top 25% and 5% of banks, respectively, in terms of total assets. An interesting finding here is that large banks tend to react more to the signs of anxiety. In particular, the results in column I reveal that large banks with higher problem loans decrease loan supply growth when consumer anxiety increases. In contrast, large banks with higher provisions increase more lending growth with CEO anxiety. It seems that these banks feel more secure to expand their loan portfolios during such periods. In the case of bank anxiety, the coefficients on all multiplicative terms are insignificant, suggesting the lack of a consistent lending behavior for this bank cohort.

As for the very large banks, problem loans is the only characteristic which banks weigh for a decrease in lending during anxious periods for both consumers and CEOs. Finally, during anxious periods for banks, capitalization takes the place of problem loans.

5.4. Further insights and other robustness checks

In this section we inquire into the robustness of our main results and provide some additional insights. A first potential criticism is that the anxiety variables essentially capture known channels in the previous literature, such as the bank lending channel of monetary policy. Note that all estimated equations include a bank-level lending rate and, thus, the part of the effect of monetary policy on lending that passed through to each bank. However, monetary policy is forward looking and thus the policy rate may mask the expectations of agents about the future state of the economy, thus affecting the loan supply of banks with similar characteristics in a more uniform way. We tackle this potential criticism by including the federal funds rate among the regressors, along with the interaction terms of the federal funds rate with the bank characteristics that potentially affect loan supply given our theoretical priors. Since here we are concerned with the identification of the different channels of anxiety – confidence – of agents vs. monetary policy, we use the full time span of the panel. The results on the multiplicative terms of anxiety variables with bank characteristics remain essentially unchanged, showing that this "confidence channel" of bank lending is distinct. Moreover, the magnitude of the estimated coefficients on the interaction terms with anxiety variables in the whole sample is much lower, than that of the relevant coefficients in Table 4 where only anxious periods are included. This strongly points to the lack of a symmetric impact of anxiety on banks' lending behavior. In other words it verifies that the impact of anxiety, i.e., falling confidence, is different from that of increasing confidence and reassures for our choice of focusing on anxious periods only.

A second criticism may be that the results are driven by the estimation method. Column IV reports the results when we re-estimate the equation presented in column I

of Table 4 with the Blundell and Bond (1998) GMM method for dynamic panels. As discussed above, this method is favored by a recent literature on the bank lending channel, but is sometimes criticized given the large variability of the results to only small changes in the set of instruments used, especially in panels with relatively large time frames. Here we use, as instruments, the second and third lags of our dependent and explanatory variables, which yield accepted values on the Sargan test for overidentifying restrictions. The results between column IV of Table 7 and column I of Table 4 are very similar. Also, similar results emerge from estimating the rest of the baseline specifications of Table 4. These results are available on request. In general, this finding is in line with the econometric literature suggesting that for very large panels the results of different methods converge (see Baltagi, 2005).

Another potential drawback is that, despite the fact that all explanatory variables enter the estimated equations lagged, these may still be endogenous to the macroeconomic environment. In column V we conduct an additional sensitivity analysis to ease concerns on this front. Specifically, we examine whether the results remain intact when the shock to the economy is purely exogenous, i.e., it has no relationship with bank behavior. Clearly, the most prominent example of such a shock is the hit on the towers. As expected, during the fourth quarter of 2001, all agents were anxious and the economy was in a recession. We re-run the main specifications of Table 4 (again we only report the one equivalent to equation I of Table 4), using OLS on data for 2001Q4. The results are qualitatively similar with the respective of Table 4.

As a final exercise, we examine whether the behavior of banks is different between anxiety periods that actually led to a recession and those that did not. This analysis is important, as it may reveal why some anxiety periods have unfolded to

recessions and other have not. In the last three columns of Table 7 we report the results using the periods of bank anxiety that led to a recession. Since these periods are still somewhat different across the three types of agents, we report three equations for consumer, CEO and bank confidence, respectively. The results are, in our view, remarkable, as the average bank behavior seems to be different in anxiety periods that led to a recession, compared to the average behavior for all anxiety periods. Specifically, banks with a high level of problem loans increase their lending growth when consumers' or banks' anxiety increases and large banks increase their lending when bank anxiety peaks. Naturally, it may be the case that reduced agents' anxiety given the severity of economic conditions and/or other macroeconomic policies may play a role. Or, this behavior may be led by the moral hazard and/or the competition mechanism outlined in Section 5.1 above. Then, one may think that these theories provide a good story for the recent financial turmoil. Banks, and especially large and very risky ones, continued to lend even just before the financial turmoil of 2007. This accelerated the events and exacerbated the crisis, which found banks with low levels of liquidity and very risky loans.

6. Conclusions

In this paper we examine empirically the lending behavior of banks during anxious periods of the economy. We define anxious periods from each economic agent's perspective, i.e., households, firms and banks, using a heuristic approach. Our results indicate that bank lending responds differently to the anxiety of different agents, however the response has a common denominator, namely credit risk. Other bank characteristics, such as capitalization and liquidity are not driving the lending decisions of banks in anxious periods.

More specifically, an increase in consumers' anxiety yields a drop in total loan supply growth for banks with higher problem loans and less so for these with higher provisions. On the other hand, banks do not alter their total lending with firms' anxiety, while problem loans – an ex post proxy for credit risk – is also the key mechanism that leads to a decrease in lending growth when banks are anxious themselves. Moreover, bank anxiety, i.e., tightening of credit standards, triggers intensified competition between larger banks in credit supply growth. As for different loan categories, an increase in anxiety for consumers, CEOs and banks does not have the same impact across these categories, nor do banks behave in a consistent manner depending on their characteristics.

All in all, it seems that bank lending behavior is affected by anxiety of consumers and banks, both of which are procyclical. In addition, there is evidence that large banks tend to react more to the signs of anxiety. It seems that banks respond only when they expect that they will be facing problems in the near future, a finding consistent with Rajan's (1994) theoretical prediction for banks' short term interest. However, the fact that banks do not respond when their bigger customers, i.e., large firms, are anxious, shows that they neglect an indicator – CEO confidence – which responds earlier and more profoundly than consumer confidence to shocks.

Appendix: The results on the main effects

The findings on the main effects of the regressions presented in Section 4 are consistent with expectations. In Table A1 we report the results on the main effects of the regressions I, III, V and VII of Table 4, which are the baseline results of the paper. The main effects of the rest of the estimated equations are available on request. A first interesting finding is that the coefficient on the lagged dependent variable turns out negative and statistically significant. The negative sign is intuitive, since the dependent variable is in differences. However, the value of the coefficient is not particularly high, showing that loan growth persists only to a moderate extent.

The coefficients on the bank-level and macroeconomic variables included in interaction terms should be interpreted with caution. Consider for example the coefficient on *Δ in consumer confidence* = 0.015 (t-statistic = 0.181) in column I. This coefficient measures the effect of a change in consumer confidence at time t-1 on loan growth at time t, when the impact of *capitalization*, *liquidity*, *problem loans*, *provisions* and *size* equals to 0. Since the bank characteristics are significant determinants of loan growth, this is clearly not interesting. Also, the t-statistic says nothing about the significance of the coefficients involved. To estimate the partial effects of the anxiety variables we need to plug in interesting values of the bank-specific variables, in particular mean values. Then we re-run the regression, replacing e.g. *Δ in consumer confidence* capitalization* with *Δ in consumer confidence** [*capitalization*- (mean of *capitalization* across the sample)]. This gives as a new coefficient on *Δ in consumer confidence*, i.e. the estimated effect at *capitalization* equal to its mean.

The results at mean values of the confidence variables (not reported but available on request) show that banks with higher levels of capital and liquidity today

will increase their lending activity in the following year. This is expected as very high capital and/ or liquidity levels are expensive to hold. Naturally, banks will use excess capital and liquidity of the previous period to expand, *inter alia*, their lending. Provisions (an ex ante proxy for credit risk) in the previous year are positively related with total loan growth. This shows that if banks feel secured today by means of a high level of provisions, they will expand lending in the next period. The opposite is true for the relationship between non-performing loans (an ex post measure of credit risk) and loan growth. A high level of non-performing loans today will signal a very risky position and banks will find it optimal to decrease lending in the future. The impact of a change in the lending rate on loan growth is negative and significant at the 1% level. This shows that our choice for a price variable in the reduced-form equation is sensible.

Perhaps most importantly in our case, the main effects on the confidence variables (after re-running the regressions with the multiplicative terms including the deviation of bank-level variables from their means) obtain values 0.066 (t-statistic=4.61), 0.55 (t-statistic=2.06) and 0.048 (t-statistic=3.39) for regressions I, II and III of Table A1, respectively. Thus, increased confidence, especially when stemming from consumers or banks themselves, boosts loan growth. Note that by themselves these coefficients contain both demand- and supply-side effects. As discussed above only the multiplicative terms of these variables with bank characteristics can be interpreted as supply-side effects. However, this finding indeed verifies the use of the three variables as indices capturing the anxiety of economic agents and shows that the model is well-specified and provides results in-line with expectations.

Concerning the rest of the macroeconomic and regulatory control variables, we find that a change in industrial production affects loan growth positively. Breaking total loans down to the different categories and re-running the regressions (as we do for Table 5) shows that the positive effect concerns commercial and industrial loans. This is intuitive, since these are the loans associated with investments, feeding back productivity in the future. In contrast, loans to individuals and households and loans secured by real estate are not affected by changes in industrial production. Evidently, it seems that consumer confidence absorbs all the effect on these loans (i.e. a demand effect), which shows that our econometric model is able to account for the differentiation between demand- and supply-side effects. In turn, the impact of the regulatory dummies shows that the introduction of a deposit insurance scheme in 1989 (regulatory dummy 1) caused a one-time reduction in loan growth. In turn, the "Interstate Banking and Branching Efficiency Act" introduced in 1994 exerted a strong positive effect on lending through the abolition of geographic requirements and associated exploitation of economies of scale.

Table A1
Supplement to Table 4: Main effects of regressions

	I	II	III	IV
Period type:	Anxious	Anxious	Anxious	Recession
Agent type:	Consumers	CEOs	Banks	All agents
Lagged dependent	-0.084*	-0.068**	-0.065**	-0.075**
	(-1.808)	(-2.101)	(-2.053)	(-1.980)
Capitalization	0.272***	0.256***	0.243***	0.262***
	(4.609)	(6.048)	(3.463)	(18.053)
Liquidity	0.097***	0.094***	0.078***	0.037***
	(4.798)	(4.535)	(4.668)	(4.565)
Problem loans	-0.325***	-0.247***	-0.342***	-0.312***
	(-4.924)	(-2.698)	(-5.003)	(-5.534)
Provisions	0.003***	0.002**	0.004***	0.005***
	(3.449)	(2.431)	(5.180)	(5.396)
Size	-0.026***	-0.023***	-0.024***	-0.023***
	(-15.651)	(-14.374)	(-17.183)	(-28.601)
Efficiency	-0.000	0.010	-0.005	-0.005
	(-0.076)	(1.265)	(-1.080)	(-1.049)
Δ in lending rate	-0.019***	-0.015***	-0.012***	-0.017***
	(-3.831)	(-2.764)	(-3.653)	(-8.198)
Δ in industrial production	0.653***	0.412***	0.286***	0.130**
	(11.904)	(8.487)	(5.425)	(2.152)
Regulatory dummy 1	-0.022***	-0.008***		-0.002***
	(-18.450)	(-5.257)		(-4.570)
Regulatory dummy 2	0.009***	0.020***	0.017***	0.015***
	(6.687)	(16.933)	(26.772)	(24.869)
Δ in consumer confidence	0.015			
	(0.181)			
Δ in CEO confidence		-0.032		
		(-0.238)		
Δ in bank confidence			-0.148***	
			(-2.585)	
Recession				0.013*
				(1.908)
Constant	0.265***	0.241***	0.295***	0.250***
	(15.913)	(11.513)	(17.780)	(30.113)

Notes: The table reports the main effects of the regressions I, III, V and VII of Table 4.

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Table 1
Variable definitions and sources

Notation	Measure	Data source
A. Dependent variables		
Δ in total loans	Change in the natural logarithm of total loans over the previous quarter	Y-9C Call Reports
Δ in loans to individuals	Change in the natural logarithm of loans to individuals and households over the previous quarter	Y-9C Call Reports
Δ in commercial and industrial loans	Change in the natural logarithm of commercial and industrial loans over the previous quarter	Y-9C Call Reports
Δ in loans secured by real estate	Change in the natural logarithm of loans secured by real estate over the previous quarter	Y-9C Call Reports
B. Explanatory variables		
*a) Bank-level variables**		
Capitalization	The ratio of total equity capital to total assets	Y-9C Call Reports
Liquidity	The ratio of liquid assets (cash and short-term securities) to total assets	Y-9C Call Reports
Problem loans	The ratio of non-performing or problem loans to total loans	Y-9C Call Reports
Provisions	The ratio of provision for loan and lease losses to total loans	Y-9C Call Reports
Size	The natural logarithm of real total assets	Y-9C Call Reports
Efficiency	The ratio of total income to total expenses	Y-9C Call Reports
Δ in lending rate	The change over the previous quarter of the ratio of interest and fee income on loans to total loans	Y-9C Call Reports
b) Variables characterizing the state of the economy		
Δ in industrial production	Change in the natural logarithm of the US industrial production over the previous quarter	Datastream
Δ in consumer confidence	Change in the natural logarithm of US consumer confidence over the previous quarter	Datastream (The Conference Board)
Δ in CEO confidence	Change in the natural logarithm of US CEO confidence over the previous quarter	Datastream (The Conference Board)
Δ in bank confidence	Change in banks' terms of credit for commercial and industrial loans to medium and large firms	Senior Loan Officer Opinion Survey, Federal Reserve
Δ in the Federal Funds rate	Change in the Federal funds rate over the previous quarter	Datastream
c) Variables characterizing the confidence (anxiety) of agents		
Anxious consumers	The value of a Δ in consumer confidence in periods when: (i) the value of consumer confidence declines for two consecutive quarters or (alternatively) (ii) when consumer confidence declines in one quarter and its value in that quarter is below its mean value across the full sample	Own calculation based on consumer confidence data
Anxious CEOs	The value of a Δ in CEO confidence in periods when: (i) the value of consumer confidence declines for two consecutive quarters or (alternatively) (ii) when CEO confidence declines in one quarter and its value in that quarter is below its mean value across the full sample	Own calculation based on CEO confidence data
Anxious banks	The value of a Δ in banks' terms of credit for commercial and industrial loans to medium and large firms in periods when:	Own calculation based on Senior Loan Officer Opinion Survey on bank

	(i) the value of terms of credit worsens for two consecutive quarters or (alternatively) (ii) when terms of credit worsens in one quarter and its value in that quarter is below its mean value across the full sample	lending practices data, obtained from the Federal Reserve.
d) Regulatory variables		
Regulatory dummy 1	Dummy variable obtaining a value 1 from 1989q3 onwards to capture the effect of the "Financial Institutions Reform and Recovery Act", enacted on August 9, 1989.	Own calculation based on information from the Federal Deposit Insurance Corporation
Regulatory dummy 2	Dummy variable obtaining a value 1 from 1994q4 onwards to capture the effect of the "Riegle-Neal Interstate Banking and Branching Efficiency Act", enacted on September 29, 1994.	Own calculation based on information from the Federal Deposit Insurance Corporation

Notes: All bank-level variables enter the estimated equations lagged four times.

Table 2
Summary statistics

Variable	Obs.	Mean	Std. dev.	Min.	Max.
Total loans	1,111,849	334,169.1	5,210,546	3	7.16e+08
Loans to individuals	1,059,077	52,690.4	937,991.4	0	1.37e+08
Commercial and Industrial loans	1,103,425	80,156.2	1,090,417	0	1.42e+08
Loans secured by real estate	1,104,071	166,295.1	2,983,432	0	4.75e+08
Capitalization	1,070,791	0.11	15.69	-1.47	0.73
Liquidity	1,106,024	0.07	0.08	0.00	0.99
Problem loans	1,067,112	0.007	1.01	0.00	0.86
Provisions	1,058,097	0.005	0.44	-10.08	1.09
Size	1,112,213	11.27	2.46	5.65	21.29
Efficiency	1,059,593	1.29	8.24	-10.36	72.51
Lending rate	1,052,338	0.06	1.23	0.01	0.23
Industrial production	1,116,397	74.35	15.10	54.39	100.45
Consumer confidence	1,116,397	97.00	23.98	29.87	142.10
CEO confidence	1,116,397	53.04	8.60	24.00	73.00
Bank confidence	805,744	9.51	23.76	-24.1	83.6

Notes: The table presents the number of observations (obs.), the mean, the standard deviation (std. dev.), the minimum (min.) and the maximum (max.) of the unformatted (i.e. before taking logarithms) variables used in the empirical analysis. The variables are defined in Table 1 and values are in thousand USD.

Table 3
Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Capitalization	1.00											
(2) Liquidity	0.08	1.00										
(3) Problem loans	0.02	0.04	1.00									
(4) Provisions	0.01	0.00	0.01	1.00								
(5) Size	-0.18	-0.16	-0.09	0.00	1.00							
(6) Efficiency	0.05	-0.03	-0.00	0.00	0.10	1.00						
(7) Lending rate	0.02	0.02	0.03	0.66	-0.00	0.01	1.00					
(8) Industrial production	0.14	-0.10	-0.11	0.00	0.23	0.05	-0.00	1.00				
(9) Consumer confidence	0.06	-0.11	-0.04	-0.00	-0.00	0.03	-0.00	0.35	1.00			
(10) CEO confidence	-0.03	0.03	-0.00	-0.00	-0.02	0.05	-0.00	-0.18	-0.11	1.00		
(11) Bank confidence	-0.00	0.04	0.03	0.00	0.02	-0.06	0.00	0.08	-0.17	-0.60	1.00	
(12) Federal funds rate	-0.04	-0.03	0.05	0.00	-0.15	-0.05	0.00	-0.35	0.52	-0.40	0.05	1.00

Notes: The table presents correlation coefficients between the main explanatory variables of the study. The variables are defined in Table 1.

Table 4
The response of loan supply (total loan growth) during anxious and bad times

	I	II	III	IV	V	VI	VII	VIII	IX
Period type:	Anxious	Anxious	Anxious	Anxious	Anxious	Anxious	Recession	Recession	Recession
Agent's anxiety type:	Consumers	Consumers	CEOs	CEOs	Banks	Banks	Consumers	CEOs	Banks
Δ in agents' anxiety* capitalization	-0.628	-0.615	-0.148	0.102	0.190	0.086	0.065	-0.003	0.058
	(-1.067)	(-1.269)	(-0.420)	(0.802)	(0.678)	(0.270)	(1.513)	(-0.073)	(1.429)
Δ in agents' anxiety* liquidity	0.007	0.091	-0.103	-0.007	0.432	0.300	-0.068**	-0.058*	-0.054*
	(0.050)	(0.936)	(-0.338)	(-0.032)	(1.118)	(0.659)	(-2.008)	(-1.730)	(-1.743)
Δ in agents' anxiety* problem loans	-1.226***	-1.832*	-0.315	-0.616	-1.847***	-1.786**	-0.426**	-0.460***	-0.242*
	(-3.256)	(-1.890)	(-1.286)	(-1.157)	(-2.834)	(-2.372)	(-2.303)	(-2.643)	(-1.802)
Δ in agents' anxiety* provisions	-0.112***	-0.180***	0.030	0.031	0.225***	0.015	-0.126	0.336	0.598*
	(-2.685)	(-2.735)	(0.804)	(0.948)	(8.731)	(1.006)	(-0.257)	(0.938)	(1.753)
Δ in agents' anxiety* size	0.000	-0.006*	-0.004	0.005	0.006*	0.015***	0.012***	0.013***	0.006***
	(0.026)	(-1.706)	(-0.488)	(0.016)	(1.675)	(3.315)	(10.448)	(11.262)	(6.791)
Constant	0.265***	0.292***	0.241***	0.383***	0.295***	0.580***	0.220***	0.201***	0.210***
	(15.913)	(18.341)	(11.513)	(16.381)	(17.780)	(14.723)	(8.877)	(8.205)	(8.262)
Observations	195,165	204,307	172,279	124,387	102,536	58,894	106,615	106,615	106,615
Number of banks	18,358	18,296	16,197	16,971	13,375	10,473	15,192	15,192	15,192
R-squared	0.141	0.140	0.134	0.133	0.141	0.148	0.203	0.221	0.251

Notes: The table reports coefficients and t-statistics (in parentheses). Dependent variable is the change in the natural logarithm of total loans over the previous quarter. The explanatory variables are defined in Table 1. Columns I, III and V report the results with anxious periods defined as "two consecutive quarters decline in the value of the variable measuring the confidence of the respective agent". Columns II, IV and VI report the results with anxious periods defined as "one quarter decline in the value of the variable measuring the confidence of the respective agent and this variable being below its sample mean". Estimation method is limited information maximum likelihood. ***, ** and * denote statistical significance at the 1, 5 and 10% level, respectively.

Table 5
The response of different loan categories during anxious and bad times

Dep. variable:	Panel A: Δ in loans to individuals			Panel B: Δ in commercial and industrial loans			Panel C: Δ in loans secured by real estate		
	I	II	III	I	II	III	I	II	III
Period type:	Anxious	Anxious	Anxious	Anxious	Anxious	Anxious	Anxious	Anxious	Anxious
Agent's anxiety type:	Consumers	CEOs	Banks	Consumers	CEOs	Banks	Consumers	CEOs	Banks
Δ in agents' anxiety* capitalization	-0.392*	-0.589	-0.036	0.478	0.009	-0.003	-0.042	-0.398	-0.101
	(-1.903)	(-1.240)	(-0.118)	(1.467)	(0.021)	(-0.014)	(-0.285)	(-1.637)	(-0.825)
Δ in agents' anxiety* liquidity	-0.225	-0.321	-0.100	0.116	-0.408	-0.329	-0.121	-0.090	-0.036
	(-1.615)	(-0.824)	(-0.537)	(0.671)	(-0.780)	(-1.259)	(-1.269)	(-0.350)	(-0.297)
Δ in agents' anxiety* problem loans	-1.794***	3.950**	-1.028	-1.217	-6.692	-0.987	-0.507	0.763	-0.258
	(-2.784)	(2.544)	(-1.328)	(-1.549)	(-1.123)	(-0.883)	(-1.142)	(0.574)	(-0.416)
Δ in agents' anxiety* provisions	0.157	-0.237***	0.139***	-0.268***	-0.051***	-0.905**	0.020*	0.014***	0.099
	(0.324)	(-2.818)	(13.080)	(-7.239)	(-22.563)	(-2.375)	(1.837)	(3.973)	(0.416)
Δ in agents' anxiety* size	-0.009**	-0.004	-0.014**	-0.013	0.021	-0.008	-0.008***	-0.015**	0.002
	(-2.131)	(-0.466)	(-2.113)	(-1.515)	(1.333)	(-1.226)	(-2.624)	(-2.195)	(0.53)
Constant	0.342***	0.424***	0.517***	0.298***	0.289***	0.570***	0.247***	0.208***	0.235***
	(15.900)	(17.752)	(17.822)	(13.692)	(10.472)	(7.500)	(18.071)	(11.339)	(12.339)
Observations	193,980	171,117	101,807	190,749	167,984	99,642	194,001	171,202	101,870
Number of banks	18,266	16,112	13,284	18,013	15,874	13,107	18,232	16,071	13,282
R-squared	0.142	0.138	0.149	0.141	0.142	0.138	0.147	0.145	0.135

Notes: The table reports coefficients and t-statistics (in parentheses). The dependent variables are given on the first line of the table. The explanatory variables are defined in Table 1. Anxious periods are defined as "two consecutive quarters decline in the value of the variable measuring the confidence of the respective agent". Estimation method is limited information maximum likelihood. ***, ** and * denote statistical significance at the 1, 5 and 10% level, respectively.

Table 6
The response of loan supply during anxious times for large and very large banks

	Top 25% banks			Top 10% banks		
	I	II	III	IV	V	VI
Agent's anxiety type:	Consumers	CEOs	Banks	Consumers	CEOs	Banks
Δ in agents' anxiety* capitalization	-1.155	0.663	-0.027	0.541	2.362	-1.633**
	(-1.535)	(0.629)	(-0.075)	(0.657)	(1.248)	(-2.009)
Δ in agents' anxiety* liquidity	-0.203	-0.203	0.192	0.173	-0.925	0.426
	(-0.789)	(-0.318)	(0.532)	(0.316)	(-0.592)	(0.522)
Δ in agents' anxiety* problem loans	-2.737*	-24.769	-1.193	-7.756**	-89.367***	-2.448
	(-1.880)	(-0.985)	(-0.447)	(-2.052)	(-2.906)	(-0.470)
Δ in agents' anxiety* provisions	0.312	3.612***	0.094	0.214	3.566	1.494
	(0.957)	(4.845)	(0.671)	(0.073)	(0.281)	(0.552)
Δ in agents' anxiety* size	0.010	0.003	-0.006	-0.014	0.025	-0.006
	(1.423)	(0.247)	(-0.720)	(-0.531)	(0.340)	(-0.258)
Constant	0.631***	0.464***	0.505***	1.053***	1.046***	1.083***
	(8.240)	(8.581)	(11.191)	(5.358)	(5.542)	(4.734)
Observations	44,931	44,644	27,685	7,938	7,753	4,830
Number of banks	6,480	6,104	5,500	1,238	1,169	1,068
R-squared	0.192	0.202	0.188	0.195	0.209	0.193

Notes: The table reports coefficients and t-statistics (in parentheses). Dependent variable is the change in the natural logarithm of total loans over the previous quarter. The explanatory variables are defined in Table 1. Anxious periods are defined as "two consecutive quarters decline in the value of the variable measuring the confidence of the respective agent". Estimation method is limited information maximum likelihood. ***, ** and * denote statistical significance at the 1, 5 and 10% level, respectively.

Table 7
Sensitivity analysis and further insights

	Whole sample period			Anxious Consumers GMM estimates	Only 2001Q4	Anxious periods that led to recession		
	I	II	III	IV	V	VI	VII	VIII
Agent's anxiety type:	Consumers	CEOs	Banks	Consumers	Consumers	Consumers	CEOs	Banks
Δ in agents' anxiety* capitalization	-0.048	-0.095**	0.038	-0.622	-0.560	0.035	0.023	-0.051**
	(-0.646)	(-2.007)	(1.306)	(-1.497)	(-0.808)	(1.422)	(1.492)	(-2.034)
Δ in agents' anxiety* liquidity	0.009	0.020	-0.014	0.006	0.037	0.005	0.012	-0.011
	(0.203)	(0.374)	(-0.670)	(0.056)	(0.277)	(0.298)	(1.291)	(-0.487)
Δ in agents' anxiety* problem loans	-1.489	-0.329**	-0.128*	-1.223***	-1.336***	0.195**	-0.065	0.125*
	(-1.402)	(-1.967)	(-1.897)	(-3.120)	(-3.394)	(2.547)	(-0.920)	(1.820)
Δ in agents' anxiety* provisions	0.168*	0.026**	-0.006	-0.111**	-0.189***	0.000	0.000	-0.012
	(1.781)	(2.391)	(-0.132)	(-2.465)	(-2..788)	(0.092)	(0.060)	(-1.226)
Δ in agents' anxiety* size	0.013***	0.012***	0.003***	0.000	0.002	0.000	-0.000**	0.001***
	(11.315)	(11.649)	(7.475)	(0.027)	(0.458)	(0.275)	(-2.368)	(3.922)
Federal funds rate* capitalization	0.023	-0.017	-0.011					
	(1.326)	(-1.040)	(-0.410)					
Federal funds rate * liquidity	-0.001	-0.007	0.007					
	(-0.131)	(-0.704)	(0.214)					
Federal funds rate* problem loans	0.185**	0.180**	0.018					
	(2.068)	(2.248)	(0.148)					
Federal funds rate* provisions	0.010	0.011	-0.063					
	(0.255)	(0.266)	(-0.354)					
Federal funds rate* size	0.001**	-0.000	-0.000					
	(2.376)	(-1.125)	(-0.940)					
Constant	0.264***	0.261***	0.332***	0.284***	0.290***	0.265***	0.253***	0.250***
	(31.848)	(31.629)	(19.925)	(19.333)	(14.646)	(31.712)	(31.478)	(30.783)
Observations	974,194	974,194	703,727	195,165	8,670	17,032	10,498	10,121
Number of banks	18,775	18,775	15,494	17,984	8,670	9,555	8,921	8,892
R-squared	0.188	0.184	0.176	0.142	0.284	0.149	0.145	0.147

Notes: The table reports coefficients and t-statistics (in parentheses). Dependent variable is the change in the natural logarithm of total loans over the previous quarter. The explanatory variables are defined in Table 1. Anxious periods are defined as "two consecutive quarters decline in the value of the variable measuring the confidence of the respective agent". Estimation method is limited information maximum likelihood, except from column IV where GMM for dynamic panels is used. ***, ** and * denote statistical significance at the 1, 5 and 10% level, respectively.

Figure 1

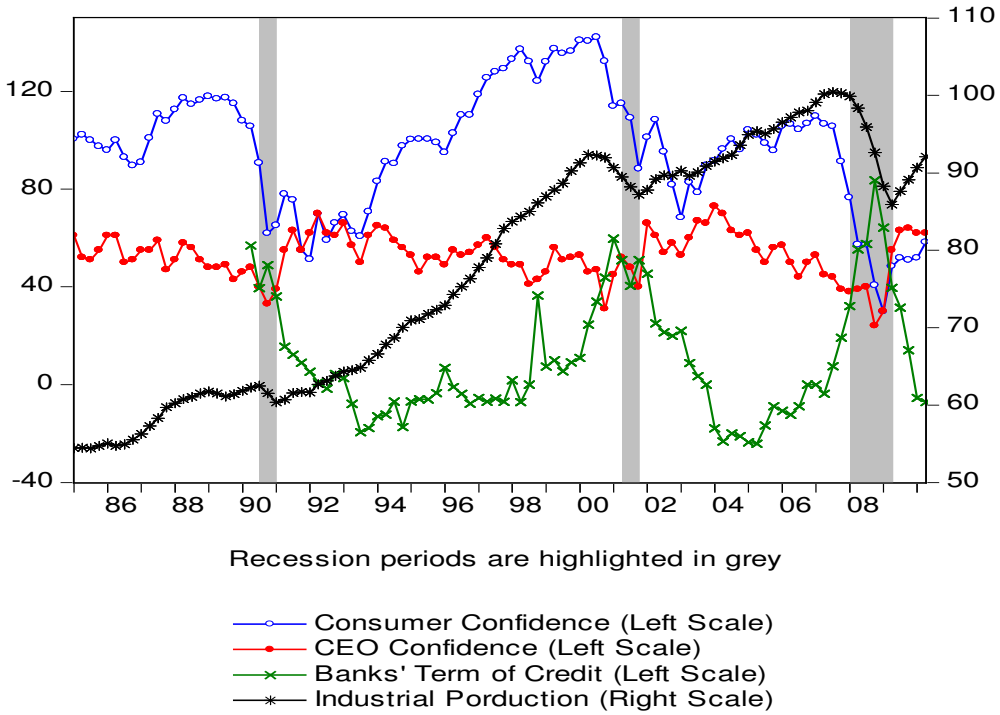
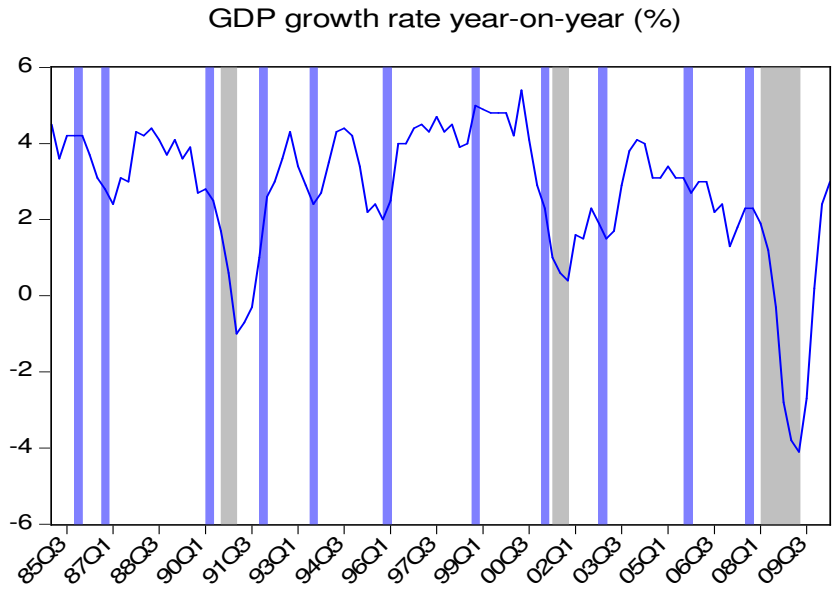
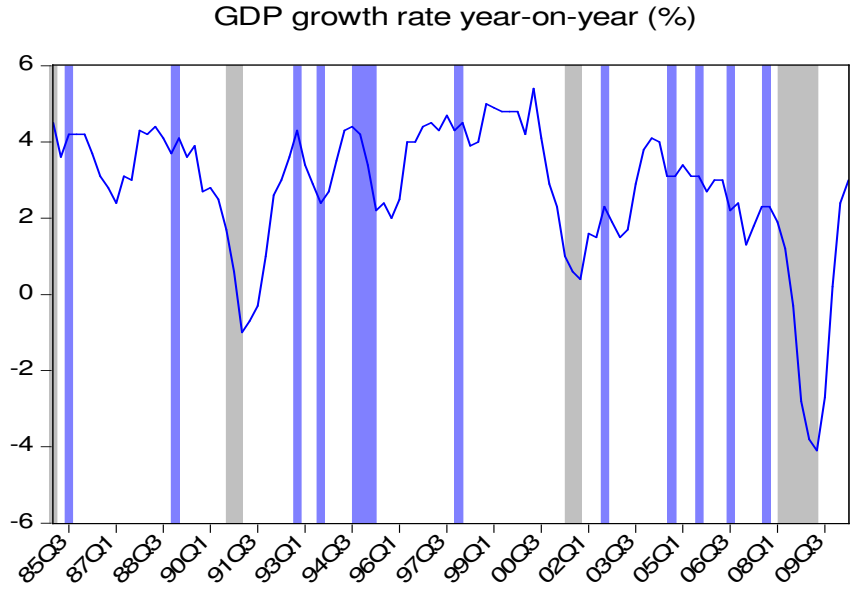


Figure 2



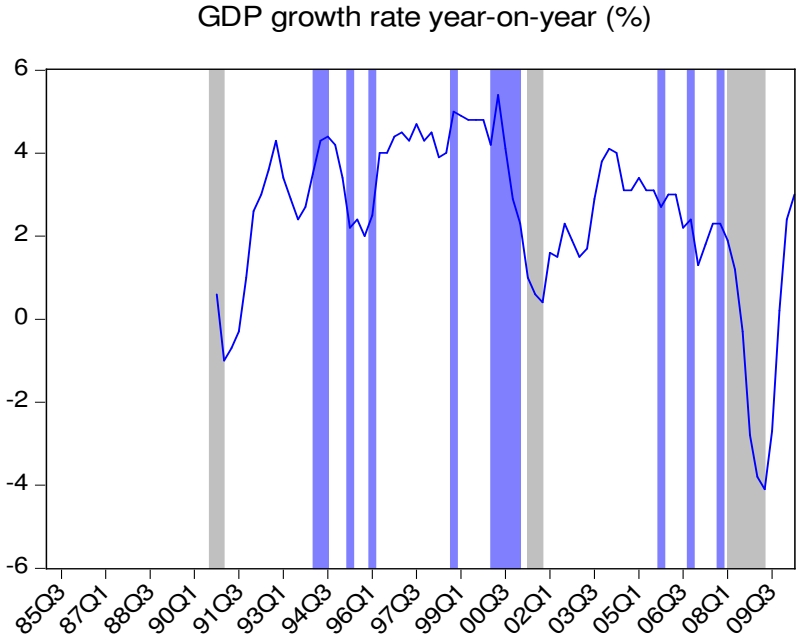
Anxious Periods Based on Two Consequtive Quarters Falling Consumers' Confidence
Recession Periods are Highlighted in Grey

Figure 3.



Anxious Periods Based on Two Consequtive Quarters Falling CEOs' Confidence
Recession Periods are Highlighted in Grey

Figure 4.



Anxious Periods Based on Two Consequtive Quarters Tightening Banks' Terms of Credit
Recession Periods are Highlighted in Grey