# Anxious periods and bank lending

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**ABSTRACT**

We define three distinct periods of anxiety for economic agents that are involved in lending decisions; namely, consumers, CEOs, and banks. Subsequently, we study the lending behavior of US banks during the three pools of anxious quarters from 1985-2010. We find that banks' lending falls when consumers and banks are anxious, and this effect is more pronounced when banks hold a high level of credit risk. Yet, in anxious periods that were followed by recessions, the negative impact of anxiety on loan growth is significantly weaker. These findings point to the identification of an 'expectations channel' in banks' lending.

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A large amount of literature stresses the essential role that banks play as liquidity providers and transmitters of monetary policy shocks (e.g., Bernanke and Gertler, 1989, 1995; Diamond and Rajan, 2001; Hölstrom and Tirole, 1997). Moreover, the literature pays special attention to this role during or at the onset of recessions (e.g., Bernanke et al., 1996). A new line of research highlights the strong impact of expectations over the business cycle for leverage and, thus, credit (e.g., Bhattacharya et al., 2011; Fostel and Geanakoplos, 2008; Geanakoplos, 2010). This literature stresses that changes in expectations can cause credit cycles; namely, fluctuations in leverage and credit can affect the path of the economy. These fluctuations range from expansions, in which banks' lending increases and risk aversion decreases, to contractions or even crises, in which 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 shows the importance of banks' lending behavior in the formation of the development and reinforcement of the crisis.

In this paper, we explore changes in banks' loan supply during periods when economic prospects worsen, but the economy is not in a recession. This subject is of great interest because banks' lending behavior during these periods can either ease uncertainty or impose further strain on the economy. Specifically, this behavior can cause credit crunches with serious implications for the economy and the banking system. How can these phases of economic anxiety be identified from the data and how is banks' lending shaped during such phases? Do bank lending decisions have any role during these anxiety periods for the origination of banking problems or even the start of a crisis? Our paper aims to shed some light on these questions and points to a distinct channel driven by expectations that affects banks' lending decisions.

We borrow the discussion of an anxious economy from Fostel and Geanakoplos (2008) who define anxious periods as intermediate states of the economy related to bad

news in the market. These anxious states of the economy might be followed by a recession or, as in most cases, the economy moves back to a good state. Here, we place this concept of anxiety within a real-economy framework with incomplete information and bring financial intermediaries explicitly into the picture (see Shin, 2009). In our setting, there are three main players in the economy: households, firms and banks themselves. These agents' expectations on future economic outcomes can exert significant influence on the contemporaneous lending behavior of banks. Even though the anxieties of these agents might be interrelated and contemporaneous, the three agents can still be anxious during different times on the basis of their imperfect information about shocks in the economy (see, among others, Kydland and Prescott, 1982; Collard et al., 2009), rational inattention (Carroll, 2003; Sims, 2003, 2010), or even their own asymmetric goals and strategies. Thus, our setting provides the opportunity to investigate the response of banks' loan supply to the heterogeneous perceptions and expectations of different agents about the economy, rather than employing measures that encompass aggregate expectations about future economic conditions.

Therefore, we rely on a distinct measure of anxiety for each of the three economic agents and identify anxious periods from each agent's perspective. In particular, we use three indices, namely consumers' and CEOs' (firms') falling confidence and banks' tightening terms of credit; all of which, by definition, encompass diminishing expectations on economic prospects. First, consumers' confidence has information content about future economic activity rather than causes economic outcomes (Barsky and Sims, 2011); second, CEOs' confidence responds earlier and more to policy shocks than consumers' confidence (Bachman and Sims, 2010); third, the tightening of credit reflects rather than causes worsening economic conditions (Lown and Morgan, 2006). We term the falling confidence

of consumers and CEOs and the banks' tightening terms of credit as consumers', CEOs', and banks' anxiety, respectively.

We employ quarterly data on banks from the Federal Deposit Insurance Corporation (FDIC) Y9-C call reports over the 1985Q1–2010Q2 period and perform our analysis only for the anxious periods identified from each agent's perspective. Using these panels, we look into the effect of consumers', CEOs', and banks' anxieties on loan growth through certain bank characteristics. This framework has a number of important advantages. First, it eases concerns about the simultaneity problem; that is, distinguishing shifts in loan supply from those of loan demand, because we use interaction terms between certain bank characteristics and lagged values of the variables of interest (Kashyap and Stein, 2000), and because of the disaggregation approach (Calomiris and Mason, 2003). Moreover, the fact that these variables contain information about future economic activity further eases such concerns. A battery of robustness checks provides further support against simultaneity.

Second, the fact that recessions do not follow all economic slowdowns and declines in agents' expectations may suggest a special role for banks' lending. In this way, we aim to shed some light not only to the term horizon of banks when things in the economy get worse (see Rajan, 1994), but also to the possible similarities in banks' lending activity during anxious periods and recessions. Third, our framework provides a strategy for examining which bank characteristics determine the lending behavior of banks during anxious periods and whether the more important banks follow different strategies due to moral-hazard issues associated with too-big-to-fail concerns of governments, regulators, and the public. Last but not least, our framework offers some insights on the way in which banks conduct competition when different economic agents are anxious about future economic outcomes.

Our results indicate that consumers' and banks' anxieties negatively affect loan supply, and this response is primarily distributed through high-credit risk. Other bank

characteristics, such as capitalization and liquidity, do not seem to drive banks' lending decisions in anxious periods. In contrast, total loan growth is less sensitive to CEOs' confidence even though the growth of certain loan categories passes through the provisioning decisions of banks. Notably, these findings are different, if not opposite, in anxious periods that actually lead to a recession. This difference potentially suggests a special role for banks in exacerbating the economic downturn. In addition, evidence exists that large banks tend to react more than smaller ones to the signs of anxiety; however, their reaction frequently involves a higher loan growth relative to the average bank during anxious periods. Several robustness checks provide strong support to these results. In general, these findings suggest the potential existence of a new channel for the lending behavior of banks that can be termed an 'expectations channel.' Our study is, to the best of our knowledge, the first to provide empirical evidence on the existence of such a channel that affects the supply of credit from banks and the way it operates.

The rest of the paper is organized as follows: Section I discusses the concept of anxious periods of the economy. This section also surveys the literature on consumers' and CEOs' expectations and their relation to the economy, as well as discussing banks' lending strategies across the business cycle. Section II describes the data and the identification strategy of the anxious phases of the economy, while Section III discusses the empirical method. Section IV presents and discusses the empirical results and Section V concludes the paper.

## I. Anxious Periods

As already mentioned, we borrow the discussion on the anxious – vs. good and bad – states of the economy from Fostel and Geanakoplos (2008) and place it within a real-economy setting with incomplete information. In our context, bad states are the recession periods that

we identify by following the NBER's formal definition and thus, are uniform across all economic agents. We use banks' lending activity during recessions as a benchmark against their activity during anxious periods. The sample period examined, 1985Q1–2010Q2, encompasses three recession periods: 1990Q3–1991Q1, 2001Q2–2001Q4, and 2008Q1–2009Q2.

However, during anxious phases different economic agents can view different economic outcomes or perceive policy shocks and/or news about the economy in a rather different way. For example, a restructuring of the tax system towards higher personal income and lower corporate taxation might improve firms' appraisal of future economic conditions and worsen consumers' perception about their own future income. In addition, consumers might be more concerned with fluctuations in employment or prices. Moreover, the presence of informational asymmetries between CEOs and consumers can add to this heterogeneity in perceptions and expectations. It is natural to assume that firms' managers are generally better informed about the prospects of the economy than consumers, because they focus on investment prospects and future profitability which a large number of factors affect. To this end, businessmen and CEOs have better access to information and possibly a better understanding of economic news and analyses. Bachman and Sims (2010) verify the advantage of CEOs over consumers in reacting more quickly to economic signals and point out that CEOs' confidence responds earlier and by more to a policy shock than consumers' confidence does.

Moreover, banks can also have their own view about current and future economic conditions that determines their lending strategy, which may not, at least in principle, coincide with those of CEOs and consumers. Stated more explicitly, it might be the case that CEOs, consumers, and banks do not share the same expectations nor do they have the same information set at a certain point in time about the economy and its prospects.

Given the above, we employ three separate indices to capture consumers', CEOs', and banks' anxieties regarding the state of the economy. From the consumers' and CEOs' points of view, we represent their anxieties as falling consumers' and CEOs' confidences. From the banks' point of view, we represent anxiety with rising lending standards.

We briefly review the literature on the role of consumer and CEO confidence in Section I.A below. A discussion about the relationship between bank lending during anxious periods is given in Section I.B. Finally, details on the three indices used to specify anxious periods for each agent's perspective and on the rules employed for the identification of anxious periods are provided in Section II.

*A. Confidence and the Economy*

The role of confidence in the economy ranges from causing economic outcomes, the 'animal spirits view' (Keynes, 1936; Blanchard, 1993; Akerlof and Shiller, 2009), to being an information provider for the future state of the economy, the 'information view' (Cochrane, 1994; Bachman and Sims, 2010). In line with this second view, confidence can also be a time-varying discount factor for the future state of the economy (Bachman and Sims, 2010). However, very recently Barsky and Sims (2011) provide evidence in favor of the information content of consumers' confidence about future economic activity rather than the 'animal spirits view.' This evidence provides strong support to our choice for representing consumers' anxiety about future economic prospects with falling confidence and eases concerns on the potential simultaneity problem of distinguishing between the effects of consumers' confidence on loan supply versus that on loan demand.

The empirical evidence suggests that consumers' confidence has predictive ability over relatively short horizons for economic aggregates (Matsusaka and Sbordonne, 1995; Lemmon and Portniaguina, 2006) and future consumption growth (Carroll et al., 1994;

Ludvigson, 2004). It also plays a prominent role in the Fed's intervention decisions (Hu and Phillips, 2004) and has emerged as a much better barometer of economic activity and investors' attitudes during the last three decades (Lemmon and Portniaguina, 2006).

The vast majority of the literature focuses on consumers' confidence. A rare exception is Bachman and Sims (2010) who find that both consumers' and CEOs' confidences play a modest role in the transmission of policy shocks into the economy, although CEOs' confidence plays a more essential role to this propagation than consumers' confidence in that it responds earlier and more to these shocks.

*B. Banks' Lending Decisions in Anxious Periods*

Apart from the well-documented credit channel that drives banks' lending decisions over the business cycle (e.g., Bernanke and Gertler, 1995), the literature also puts forth other mechanisms operating primarily through lending standards. Lown and Morgan (2006) document that lending standards are superior to interest rates in explaining economic fluctuations, but shocks to the monetary-policy rate do not cause changes in standards. They also show that part of lending standards' variation is related to changes in loan supply rather than demand.

The empirically documented countercyclical variation in banks' lending standards (see e.g., Asea and Bloomberg, 1998) can be attributed to bank managers' short-term interest and reputation considerations (Rajan, 1994) as well as to their growing inability to identify potential borrowers' problems as the business cycle evolves (Berger and Udell, 2004). Ruckes (2004) shows that bank effort in screening potential borrowers is an inverse U-shape function of economic prospects. He argues that this is primarily due to the varying quality of borrowers and the relevant profitability of information production over the business cycle; however, the screening effort also depends on the loan applicants' sector.

Moreover, banks' strategic behavior in credit screening and lending decisions plays a key role as information asymmetry across banks moves in the same direction as lending standards, while its effect on banks' lending behavior operates either through credit screening or collateral requirements (Dell'Ariccia and Marquez, 2006). In the same spirit, Gorton and He (2008) attribute periodic credit crunches and endogenous credit cycles to banks' strategic competition for borrowers through lending standards rather than loan prices.

This literature's arguments on the lending behavior of banks point to a potential impact of agents' anxiety on new loans that should be stronger than that on total loans, which is our focus. This is mainly because banks' loan portfolio management does not operate in a vacuum. As Rajan (1994) and Ruckes (2004) stress, banking problems and financial instability originate in boom times. Bank total loan portfolios are not easily restructured and bank characteristics that reflect past bank behavior in asset management can play a key role during anxious phases. For example, as the economy moves to anxious periods, lax lending behavior by banks during good times in the economy can put a considerable burden on banks' credit risk during anxious times and thus affect their contemporary lending decisions. A low liquidity position or capitalization of banks can also put additional weight on institutions. If banks deleverage their balance sheets during anxious periods, and do so simultaneously, this strategy might cause systemic stress through liquidity crunch and threaten financial stability (Adrian and Shin, 2008). As the economy moves to anxious periods all the above point to a reduction in lending that might be caused by (i) tighter terms of credits on new and past loan customers alike, (ii) changing lending decisions by banks towards different loan categories, and (iii) increased collateral requirements for new loans.

## II. Data Description and Identification of Anxious Periods

*A. Data and Variables*

Table I reports how the variables employed in the empirical analysis are measured and their data sources. Data on the bank-level variables come from the Y-9C call reports. These reports provide financial account data on a quarterly basis for all commercial banks that are regulated by the Federal Reserve System, the Federal Deposit Insurance Corporation, and the Comptroller of the Currency. We use data on all available commercial banks for the period 1985Q1–2010Q2. This data yield an initial unbalanced panel of 1,116,397 bank-quarter observations.

From this dataset, we calculate for each bank the total loan growth as the change in the natural logarithm of total loans over the previous quarter. This is the main dependent variable of our study. To get more insights into the lending behavior of banks during periods of anxiety, we also examine three separate loan categories. These categories are: loans to consumers, commercial and industrial loans, and loans secured by real estate.

[Insert Table I here]

As already mentioned, the main explanatory variables of our study relate to consumers', CEOs', and banks' anxieties. We measure the anxieties of these agents with the falling confidences of consumers and CEOs and with the tightening terms of credit by banks. For consumers' confidence we use the Conference Board's consumers' confidence survey that is conducted monthly on a representative sample of 5,000 consumers. In this survey, there are five questions that measure the following: current (i) business and (ii) employment conditions; six-month expectations on (iii) business and (iv) employment conditions, as well as (v) total family income. There are three available responses to each of these questions: positive, negative, and neutral. After a seasonal adjustment for the response rate, a single sub-index value is calculated for each question 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 consumers' confidence index is then calculated as the average of all five sub-indices. Lower values in this index reflect higher consumers' anxiety.

In turn, for CEOs' confidence we use the Conference Board's CEO survey. This survey is conducted quarterly using 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 sell as services. The survey has four questions that measure the following: 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 of 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 that results in a number in the [0, 100] interval. Lower values of this index reflect higher CEOs' anxiety.

Lastly, to represent banks' anxiety, we use 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 banks' lending practices. The Federal Reserve conducts this survey quarterly 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 the credit market and lending conditions in the U.S. The survey covers banks from all of the 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 the ratio of respondents reporting the tightening of terms during the previous quarter minus those who report easing terms to the sum of respondents. In contrast to the

consumer- and CEO-confidence indices, a higher value on banks' terms of credit reflects rising banks' anxiety on future economic conditions.

The lending equation is identified at the bank level, and thus we need to control for a number of individual bank characteristics. In addition, the role of these variables is important to the empirical identification of the loan-supply equation. Following the relevant literature (e.g., Altunbas et al. 2010) we employ variables such as bank capitalization, size, non-performing loans, provisions, liquidity, and the banks' lending rate.[1] Formal definitions for these variables are provided in Table I.

In forming the banks' lending equations, we also control for the general macroeconomic conditions that affect all banks in the sample, using the change in the natural logarithm of the industrial production volume. In our robustness checks, we also use the Federal Funds rate. Finally, we control for the regulatory changes that took place in the U.S. banking industry during the period examined by constructing two dummy variables. The first takes a value one 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 one from 1994Q4 onwards to capture the effect of the "Riegle-Neal Interstate Banking and Branching Efficiency Act" enacted on September 29, 1994. Although a number of other regulatory changes took place during the period examined (Sherman, 2009), our preliminary results point to the inclusion of just these two dummies.

Table II reports the descriptive statistics for the variables employed. We report the number of observations available for each variable along with the mean, standard deviation, and the minimum and maximum values. Also, Table III shows that correlation coefficients between the main variables of our study are not high enough to suggest multicollinearity issues.

[1] We also experiment with other variables such as the cost to income ratio, the loans to deposits ratio, the loans to assets ratio, etc. These variables do not add to the empirical framework.

[Insert Tables II and III here]

Interestingly, the correlation coefficient between consumers' and CEOs' confidence takes a value of -0.11 that suggests CEOs and consumers do not react contemporaneously and/or in the same direction to the arrival of news. This is in line with the discussion in Section I about the heterogeneity of perceptions and expectations about the economy between CEOs and consumers. Moreover, this pattern is consistent with the finding of Bachman and Sims (2010) on the earlier response of CEOs' confidence to shocks related to consumers' confidence. The correlation coefficient between banks' terms of credit and CEOs' confidence is -0.60, but the correlation coefficient between banks' terms of credit and consumers' confidence is -0.17.[2] This difference suggests that banks and CEOs share more common beliefs and expectations about the economy and its prospects than banks and consumers.

Figure 1 shows the time evolution of the consumers' and CEOs' confidences and bank terms of credit over our sample period together with the industrial production growth (y-o-y) and total loan growth (y-o-y). Consumers' confidence clearly exhibits a pro-cyclical behavior. In contrast, CEOs' confidence increases substantially in periods shortly after a recession end or even when expectations suggest that the recession is ending. Moreover, periods in which consumers' confidence falls (consumers' anxiety rises) do not generally coincide with periods when CEOs' confidence falls. Another point worth mentioning is that consumers' confidence has larger swings than CEOs' confidence, but the latter exhibits a greater number of small fluctuations around its short-run trend. As for banks' terms of credit, it is well documented in the literature (Berger and Udell, 1998; Lown et al. 2000; Lown and Morgan, 2006) that this measure has countercyclical variation, which is also apparent in Figure 1. Interestingly, banks' terms of credit start rising right before recession

[2] The negative correlation coefficients of these two figures stem from the opposite definitions of the relevant indices with respect to anxiety.

periods and exhibit a peak during them. The only exception is in the 2001 recession, where it peaked about one quarter before the event.

[Insert Figure 1 here]

*B. Identification of Anxious Periods*

Apart from the measure of the size of anxiety from each economic agent's perspective, we need to identify the periods for which such an anxiety holds and for which we perform our empirical analysis. For this, we use a heuristic approach and obtain three distinct pools of quarters characterized by anxieties for consumers, CEOs, or banks respectively. In particular, we define anxious periods from each agent's perspective as a consecutive two-quarter decline in the value of the variable when the economy is not in a recession. For banks, this rule applies from 1990Q2 onwards when data on banks' terms of credit is available. This approach yields 18 quarters of anxieties for consumers and CEOs out of which only 4 quarters are common between the two. These are 1993Q3, 2005Q3, 2007Q3, and 2007Q4. For banks, we identify 14 quarters of anxiety. Only in 5 are consumers also anxious, while both CEOs and banks are anxious in 3 quarters. Interestingly, in only one quarter during the period examined, 2007Q4, are all agents simultaneously anxious. These figures justify our approach of examining anxieties from the three different economic agents' perspective and confirm the heterogeneity in agents' perceptions and expectations about the worsening of economic conditions.

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 (i) has been falling for one quarter, (ii) is lower than their sample mean, and 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, in only two quarters are consumers and CEOs both anxious, 1996Q1 and 2007Q4, while 2007Q4 is again the only quarter in which all three agents are simultaneously anxious.

Figures 2 through 4 illustrate the anxious periods for consumers, CEOs, and banks under the first rule along with the GDP growth rate (y-o-y) respectively. Anxious periods are in blue, and recession periods are in grey. Evidently, periods of consumers' anxiety always precede recession periods (see Figure 2). In contrast, Figure 3 shows that CEOs were anxious only before the 2008 recession. Finally, banks were anxious before both the 2001 and 2008 recessions.

[Insert Figures 2, 3 and 4 here]

## III. Empirical Methodology

Our empirical strategy builds on the literature relying on banks' lending equations. Kashyap and Stein (2000), and many others since, show how to overcome a number of identification problems when examining the existence of a banks' lending channel of monetary policy. Their 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 strategy 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, such as quarterly data, allows for 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. Therefore, this strategy substantially eases concerns on reverse causality issues.

The actual empirical model to be estimated for the three distinct pools of anxious quarters is the following:

$$\Delta \ln(loans)_{it} = a_0 + a_1 \Delta \ln(loans)_{it-1} + \sum_k a_{2ki} B_{kit-4} + a_3 \Delta A_{t-1} + \sum_k a_{4ki} B_{kit-4} * \Delta A_{t-1} + a_5 \Delta \ln IND_{t-1} + \sum_j a_{ji} DUM_j + u_{it} \quad , \qquad (1)$$

where the loan growth of bank *i* over the previous quarter is regressed on its lag, a number *k* of bank characteristics *B* observed over the previous year, the change in the relevant anxiety variable *A* for the respective agent between time *t*-1 and *t*-2, the interaction of these anxiety indices with bank characteristics,[3] the change in industrial production volume *IND* between time *t*-1 and *t*-2, and the two regulatory dummies $DUM_j$ defined in subsection II.A.

In equation (1), the parameter $a_3$ captures both demand and supply-side effects. Hence, the choice of the bank characteristics to be interacted with *A* is crucial to the solution of the simultaneity problem. In general, identification is guaranteed as long as the impact of each agent's anxiety is not uniform across banks with differential characteristics. Kashyap and Stein (2000) suggest using bank size and liquidity. The concept is that larger and more liquid banks can better protect their loan portfolio by lowering their larger stock of securities. Kishan and Opiela (2000) suggest that more capitalized banks are also able to insulate their loans from the effects of an adverse development by using the excess buffer of capital stock. Finally, Altunbas et al. (2010) suggest that financial innovation and the wider use of new ways of transferring credit risk have tended to diminish the informational content of the above standard bank-balance-sheet indicators. They show that indicators of credit risk

[3] Given that the correlation between the level and the interaction terms is very high (i.e., an indication of multicollinearity), we mean-center the variables (i.e., generate new variables by subtracting their means). Mean-centering also allows interpreting the coefficient of anxiety variables at the average level of bank characteristics rather than at the point where each bank characteristic is zero.

should be used along with size, capitalization, and liquidity to identify the transmission of macro variables on banks' lending. We also follow this strategy to identify the impact of anxiety on loan growth and use two measures of credit risk based on loan-loss provisions and problem loans along with the usual capitalization, liquidity, and size variables.

In the present analysis, we deviate from the literature on the banks' lending channel of monetary policy in a number of ways. First and foremost, the anxiety variables enter the estimated model in alternative equations, and these equations are estimated using only (unless otherwise specified) the pool of quarters during which the relevant agent is anxious. This choice provides a direct answer on how banks' loan behavior is shaped during the phases of anxiety of the three agents.

Second, on more technical grounds, we do not include many time lags on the dependent and the explanatory variables common to all banks (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 substantially. Instead, we assume that banks observe the developments captured by the macro variables 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, and related to the second, we include only the fourth lag of the variables that indicate the strength of banks' balance sheets. The reason is that data on bank characteristics, such as liquidity and capitalization, are highly seasonal because of the 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 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.[4]

Fourth, we do not focus on the identification of a banks' lending channel of monetary policy; and, thus, we do not include a policy interest rate among the regressors in the baseline specifications. This choice provides additional flexibility to our model because there is no consensus on what the proper monetary policy instrument should be. In contrast, we include a proxy for the bank-level lending rate among the explanatory variables that makes equation (1) a *de facto* bank loan-supply equation. This choice further eases concerns on other identification problems stemming from misspecification of the lending rate, because this variable is observed at the bank level. However, we do provide some sensitivity analysis of the results by including the Federal Funds rate among the regressors. Overall, we feel that these assumptions represent an accurate approximation of banks' behavior.

Regarding the estimation method employed, 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-differenced endogenous variables that appear in the equation. This weak correlation leads to a large bias under GMM estimation. Therefore, based on recent developments in the econometrics for dynamic panels, we estimate our equations by employing the limited information maximum likelihood (see Baltagi, 2005, pp. 153, and references therein). For robustness of our results, we also conduct a sensitivity analysis with GMM.

[4] 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.

## IV. 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 of banks during periods when consumers, CEOs or banks are anxious. For comparison purposes, we also present the results on the response of total loan growth during recessions. Second, we examine the same effect for those anxious periods that actually led to a recession[5] and for the anxious periods that only occurred after 2001Q4. Third, we explore the response of banks' loan growth for the three main loan categories: (i) loans to consumers, (ii) commercial and industrial loans, and (iii) loans secured by real estate. Fourth, we examine the lending behavior of only large and very large banks. Fifth, we conduct several other robustness exercises to ensure that the results are not driven by the key assumptions made on the empirical strategy and the set of variables employed.

Note that the definition for anxieties for consumers and CEOs is falling confidence; that is, the change in confidence is always negative. In contrast, the change in the terms of credit is always positive. For illustrative convenience, we convert the sign of changes in anxieties for consumers and CEOs from negative to positive so that interpretation of the results is uniform across all agents and a higher value on the respective indices reflects higher anxiety. Thus, the interpretation of a, say, negative coefficient on the interaction term between the anxiety variable and banks' capitalization is banks with higher capital reducing their supply of loans by more than the average bank.

For expositional brevity, and because we are interested in the interaction (partial) effects that characterize loan supply, the estimation results of the main terms are not reported for all estimated equations. For the baseline regressions, we report and discuss the

[5] These are the quarters that just preceded the three recession periods in our sample, i.e., 1990Q3-1991Q1, 2001Q2-2001Q4, and 2008Q1-2009Q2 where consumers, CEOs, and banks were anxious.

results of the main effects in the Appendix.[6] In general, the results on the main effects are consistent with expectations, suggesting that higher anxiety reflects lower loan growth rates. This effect holds irrespective of which of the three agents is considered. As discussed in the previous section, this main effect is driven by both loan supply and loan demand forces, and this is why we focus on partial effects of anxiety with the help of bank characteristics.

Briefly, one of the most notable results is that banks' lending responds differently to the anxieties of consumers, CEOs, and banks during anxious periods. Yet, this is not the case during recessions. During anxious periods, the response of banks' lending to consumers' and banks' anxieties has a common denominator: credit risk. Moreover, the results are very similar across the two different rules we use to define anxious periods. We contend that these results point to a new channel of the lending behavior of banks, which can be termed 'expectations channel'. Our study is, to the best of our knowledge, the first to provide empirical evidence on the existence of such a channel in the supply of credit from banks and the way it operates.

In particular, an increase in consumers' and banks' anxieties yields a drop in total loan 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 addition, it seems that banks' lending behavior is affected primarily by the anxieties of consumers and banks themselves, both of which are clearly procyclical. In contrast, total loan growth is less sensitive to CEOs' confidence, even though the growth of certain loan categories passes through provisioning decisions of banks. In addition, evidence exists that large banks tend to react more than smaller ones to the signs of anxiety. Several robustness checks provide strong support for these results.

[6] 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. Unless the respective variables are demeaned, 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 in the Appendix).

*A. Response of Loan Supply to Agents' Anxieties during Anxious Periods and Recessions*

Table IV reports the results of the equations for total loan growth. Columns 1 through 6 report the results when the different economic agents are anxious, while columns 7 through 9 report the results for the recession periods. Columns (1), (3), and (5) show the results with anxious periods defined with our first rule; that is, two consecutive quarters show a decline in the confidence of consumers, CEOs, and banks' tightening of credit respectively, when the economy is not in a recession. Columns (2), (4), and (6) report the respective results with anxious periods defined with our second rule; that is, one quarter decline in confidence, the respective variable being below (above for banks' terms of credit) its sample mean, and the economy not in a recession.

[Insert Table IV here]

In columns (1) and (2) the coefficients of the interaction terms between the change in consumers' anxiety and problem loans and provisions are negative and significant, the former being much larger in absolute terms than the latter (coefficients/t-statistics: -1.226/-3.256 and -0.112/-2.685, respectively, in column 1). This finding shows that an increase in consumers' anxiety yields a drop in total loan supply growth, which is more pronounced for banks with more problem loans and more provisions. An explanation for this finding is that banks with bad loan portfolios are more exposed to riskier borrowers and, thus, they take more pronounced measures in light of the worsening economic conditions. This effect is likely to be exacerbated if relationship-lending is strong. Thus, these banks lower the supply of loans to protect their balance sheet from increasing credit risk. The rest of the multiplicative terms come out non-significant, which indicates that capitalization, liquidity, and size are not driving the lending decisions of banks when consumers are anxious. Notably, in contrast to the findings for consumers' anxiety, the results reported in columns

(3) and (4) show that banks do not significantly alter their lending given a change in CEOs' anxiety.

A somewhat different picture emerges when banks are anxious themselves. In column (5) the coefficient on the interaction term between the change in banks' anxiety and problem loans is negative and significant (coefficient/t-statistic: -1.847/-2.834), while the relevant significant coefficients for provisions and size have a positive sign (coefficients/t-statistics: 0.225/8.731 and 0.006/1.675, respectively). These findings suggest that an increase in banks' anxiety—that is, tightening in terms of credit—points to a deterioration in the growth of loan supply from intermediaries with loan portfolios bearing higher credit risk. However, for more conservative banks with more provisions, as well as for larger ones in terms of asset size, the negative impact of anxiety on loan growth seems to be substantially smaller (if not turning positive). Rationally, banks with more problematic loan portfolios face significant problems and lower their lending as the credit quality of loan customers, old and new alike, worsens. This lowering leaves ample room for larger banks and banks with a higher level of provisions in the previous year to compete in the loan market. The results are quite similar when we employ our second rule for banks' anxious periods (see column 4), the only exception being that the interaction effect on provisions is no longer statistically significant.

The above findings are in line with Dell'Ariccia and Marquez (2006) and Gorton and He's (2008) theoretical predictions on the impact of bank competition on banks' lending behavior. Larger banks are possibly better equipped to extract the greater and more profitable, though more difficult to obtain, private information about borrowers during anxious periods where uncertainty rises (Ruckes, 2004; Dell'Ariccia and Marquez, 2006) and to place greater and more costly effort into the screening of borrowers during such

phases (Ruckes, 2004). Furthermore, banks with a higher level of provisions in the previous period can be in a better position to compete for borrowers during anxious phases.

The positive coefficient on the multiplicative term between banks' anxiety and size is also consistent with a moral-hazard mechanism for banks. As increased banks' anxiety triggers intensified competition between banks, it might 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 later when 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, exacerbate the passing from an anxiety to a recession period.

In a nutshell, and given the fact that consumers' confidence and bank confidence are more or less procyclical while CEOs' confidence is not so, it seems that banks' lending behavior is affected by those agents' anxieties and expectations that more closely follow the business cycle. This is a rational behavior, as banks respond only when they expect that they will be facing problems in the near future. This reasoning is consistent with Rajan's (1994) argument about banks' short-term interest. However, the fact that banks do not alter their supply of loans when their bigger customers are anxious shows that in this respect they neglect an indicator—CEOs' confidence—that responds earlier and more profoundly than consumers' confidence to shocks (Bachman and Sims, 2010). This neglect can have a serious effect on the health of bank portfolios in the medium term. Moreover, the above results verify the argument of many researchers (e.g., Rajan, 1994; Ruckes, 2004) that banking problems originate during periods of good economic prospects, but during which credit risk accumulates.

Columns (7) to (9) report the results for the recession periods. A notable difference from the results for anxious periods is that now the interaction term of 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. High problem loans still impact banks' lending behavior negatively. However, the relevant coefficient is much smaller in absolute terms than during anxious periods. This result might reflect that some banks prepare for the more stressful economic conditions of a recession during the precedent anxious times. Alternatively, it might be that the worst case scenario has materialized and banks look forward to better upcoming economic conditions. Lastly, the coefficients on the interaction between anxiety and bank size are positive and significant in all cases. This result clearly implies that during recessions the supply of loans and thus the funding of the economy originates primarily from larger banks.

*B. Response of Loan Supply to Agents' Anxieties during Specific Anxious Periods*

To examine whether the response of the lending behavior of banks to agents' anxieties plays a role in the unfolding of a recession or in the recent financial crisis, we repeat the analysis for the following specific anxious periods: (i) those that precede the three recession periods in our sample, i.e., 1990Q3–1991Q1, 2001Q2–2001Q4 and 2008Q1–2009Q2; and (ii) those that occurred after the end of the 2001Q2–2001Q4 recession. The choice for the latter period is dictated by the much talked about credit expansion that took place during the 2000s in a low interest rates environment and its possible effect on the financial crisis. Furthermore, the main institutional reforms in the U.S. financial system had already been implemented by that time, resulting in a more homogeneous period. Due to space considerations and because the findings are very similar, we report only the results obtained from using our first rule for the identification of anxious periods.

The results are reported in Table V. It is clear that the average banks' behavior appears to be different in anxiety periods that lead to a recession as compared to the average behavior for all anxiety periods. Specifically, regarding the anxious periods that precede a recession, column (1) shows that the negative impact of consumers' anxiety on loan growth is less potent and only affects banks with more problem loans, while other bank characteristics don't play any significant role. This result implies that banks with more problem loans do not behave according to the short-term interest theory. This behavior is either due to moral-hazard or due to the fact that the signs of increased consumers' anxiety and the associated higher risk for a recession are not properly considered by these banks. The same holds for more conservative banks, as the results in columns (1) and (2) of Table IV suggest.

[Insert Table V here]

When CEOs' anxiety is employed, the results in column (2) show that the impact of falling CEOs' confidence on loan growth is greater for larger banks. Considering the equivalent bank anxiety regression (column 3), for banks with more problem loans and bigger size the impact of anxiety on loan growth is weaker, while the opposite holds for banks with more capitalization.

This bank behavior might be explained by the expansionary monetary policy that usually prevails before recessions in an effort to avoid the recession or to ease its severity and the resultant behavior of banks to protect the growth rates of their earnings. Moreover, these findings could be related to the moral hazard and/or competition mechanisms outlined in subsection IV.A above. Then, our findings combined with these mechanisms provide a good explanation for the 2007–2009 financial turmoil. Banks, and especially large and/or very risky ones, continued to lend more than the average bank even just before the beginning of the financial turmoil in the summer of 2007. These banks' lending policies may

accelerated the events and exacerbated the crisis, which eventually found many banks with low levels of liquid assets and portfolios consisting of very risky loans. However, these findings should be interpreted with caution, because they do not imply that banks' lending behavior plays a role whether or not a recession occurs. They just suggest that the lending behavior of banks during anxious phases that precede recessions is different on average than the effect of the anxieties of agents during anxious phases that do not lead to a recession.

Even more remarkable are the results for the anxious periods observed after 2001Q4, especially when we use consumers' anxiety. The negative effect of anxiety on loan growth reverses for larger banks (column 4), while the same is true for banks with more provisions when CEOs' anxiety is employed (column 5). Lastly, the non-significant partial effects in column 6 show that banks' anxiety had no impact on their lending behavior. Overall, it seems that in this period banks were behaving as if they were protected from credit risk, even though the developments in 2007–2008 showed that this was not true for the majority of banks.

*C. Loan Supply for Different Loan Categories during Anxious Periods*

Table VI shows the results when we use different loan categories as dependent variables. With this analysis we not only investigate more thoroughly the lending decisions of banks, but we also further relax concerns on the simultaneity problem. Specifically, as already mentioned in Section III, identification is guaranteed as long as the impact of each agent's anxiety is not uniform across banks with differential characteristics. This argument is further strengthened when different loan categories are examined. Rationally, the impact of, for example, consumers' anxiety should not have, at least in principle, any demand effect on commercial and industrial loans. The same holds for CEOs' anxiety and loans to individuals

and consumers. Again, for space considerations we report only the results with our first rule for the identification of anxious periods.

[Insert Table VI here]

Once again, an increase in the anxieties of consumers, CEOs, and banks does not have the same impact on the supply of loans across the different loan categories, nor do banks behave in a consistent manner depending on their characteristics. In particular, with respect to loans to individuals and households (see Panel A of Table VI), more anxiety for consumers has a stronger negative effect on the supply of loans by banks with more problem loans. This finding is consistent with the result obtained for the case of total loans. A more complicated picture emerges when CEOs' anxiety increases (column 2 in Panel A). This increase in fact drives banks with higher levels of problem loans to give out more loans to individuals and households compared to the average bank. However, an opposite finding is documented for banks with a high level of provisions. Even though this result seems to be unreasonable, an explanation might be that CEOs' confidence does not exhibit a strong procyclical behavior. Thus, banks with high credit risk have a higher exposure to consumers, which presumably are viewed as safer at the time, in an effort to improve their credit risk profile. In other words, risky banks shift to less risky loans. In contrast, more risk-averse banks with more provisions in the previous year, follow a more conservative strategy by further reducing their exposure to this loan category.

In turn, when banks' anxiety is considered (column 3 of Panel A), loans to individuals and households are higher for banks with more provisions, again providing evidence for increased competition for this loan category among more conservative banks. In contrast, the impact of banks' anxiety on loans to individuals and households is more negative for larger banks.

Panel B of Table VI shows the results for commercial and industrial loans. Interestingly, only provisions drive the lending decisions of banks for this loan category for all three agents' anxieties, although the bigger impact stems from banks' anxiety. These findings suggest that increasing anxiety results in banks viewing commercial and industrial loans as more risky than the other loan categories. Evidently, for more conservative banks the expected credit risk, as measured by banks' provisions, weighs more in their lending decisions.

Further, for loans secured by real estate (Panel C of Table VI), a common finding is that banks, except for larger ones, consider (or used to consider until the 2007–2008 crisis) this type of loans as safe during anxious periods. Indeed, when consumers are becoming more anxious, the negative impact of consumers' and CEOs' anxieties on loan growth is lower for banks with more provisions. In contrast, the negative impact of anxiety on the growth of loans secured by real estate is higher for larger banks. Finally, when banks are anxious, we do not identify any significant shifts in the supply of loans secured by real estate.

The above findings are consistent with Ruckes' (2004) prediction that banks use different screening processes depending on the prospects of each loan applicant's sector as perceived by banks; sectors that are predominately industrial are perceived as having more uncertain prospects during anxious phases. Thus, it is clear from these results that banks view commercial and industrial loans as more risky, while viewing loans secured by real estate as safer.

*D. Loan Supply during Anxious Periods for Large and very large Banks*

The role of large and very large banks deserves special attention during anxious phases of the economy. Thus, we perform an analysis on total loan growth for large banks (those in the

top 25% in terms of total assets) and very large banks (those in the top 5%). The results are reported in Table VII. An interesting finding here is that very large banks react more to the anxieties of consumers and CEOs compared to the large ones.

[Insert Table VII here]

In particular, the results in columns (4) and (5) show that for very large banks with more problem loans the negative impact of consumers' and CEOs' anxieties on loan growth is greater. This effect is in line with the theory of the short-term interest of banks. In addition, this effect is larger than that observed for the full sample (see columns 1 and 3 in Table IV) or than the one observed for the top 25% of banks (see columns 1 and 2 of Table VII). Also, the fact that the interaction term between CEOs' anxiety and problem loans is an important determinant of loan supply growth for very large banks shows that these banks are the only ones that seem to look for earlier signals of shocks when shaping their lending decisions. Finally, we identify a negative response of loan growth to banks' confidence only for banks with high amounts of capital.

*E. Further Insights and Robustness Checks*

In this subsection, we examine the robustness of our main results and provide some additional insights. A first potential criticism of the analysis above is that the anxiety variables essentially identify the banks' lending channel of monetary policy and not a new channel. Note that all estimated equations already include a bank-level lending rate and, thus, part of the effect of monetary policy on lending that passes through to each bank. However, since monetary policy is forward looking, the policy interest rate might also reflect expectations about the future state of the economy.

We tackle this potential criticism by including the Federal Funds rate in equation (1) along with the interaction terms of this variable with the bank characteristics that potentially

affect loan supply. We use the full time span of the panel, 19985Q1–2010Q2, since here we are concerned with the identification of the channel of expectations of agents versus the channel of monetary policy. The results are reported in columns (1)-(3) of Table VIII. The multiplicative terms of variables that measure the confidence of consumers and CEOs and banks' terms of credit with bank characteristics remain significant, showing that the 'expectations channel' that we identify is essentially distinct from the banks' lending channel.[7] Further, rerunning the regressions of Table IV (i.e., for the distinct pools of quarters) and including the Federal Funds rate and the relevant multiplicative terms among the regressors, gives very similar results. These results are available on request.

[Insert Table VIII here]

A second criticism might be that the results are driven by the estimation method. Column (4) of Table VIII reports the results when we re-estimate the equation presented in column (1) of Table IV with the Blundell and Bond (1998) GMM method for dynamic panels. As discussed above, this method is favored by the recent literature on the banks' lending channel but is sometimes criticized because of 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 acceptable values on the Sargan test for over-identifying restrictions. The results are very similar with those obtained with the limited information maximum likelihood estimator. Also, similar results emerge from estimating the rest of the baseline specifications of Table IV (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 should converge (see Baltagi, 2005).

[7] In fact, the findings show that the banks' lending channel is not particularly potent. Even though much more sensitivity analysis is needed to reach such a conclusion, this finding is in line with relatively recent studies of the banks' lending channel in the USA (e.g., Ashcraft, 2006). Also, the fact that a banks' lending channel seems to operate primarily through bank credit risk is in line with the findings of Altunbas et al. (2010) for the European banking industry.

A third potential drawback is that, despite the fact that the change in each agent's anxiety enters the estimated equations lagged, it might still be endogenous to banks' lending behavior and/or to the macroeconomic environment. In column (5), we conduct an additional sensitivity analysis to ease concerns on this issue. Specifically, we examine whether the results remain intact when the shock to agents' anxieties is purely exogenous. Clearly, the most prominent example of such a shock is the 9/11 terrorist attack in New York. As expected, during the fourth quarter of 2001 all agents were anxious, while the economy was already in a recession. We re-run the main specifications of Table IV (again we only report the one equivalent to column 1 of Table IV), using OLS on data for 2001Q4. The results are qualitatively similar to those of Table IV.

Fourth, to provide one more argument against the potential criticism on the simultaneity and endogeneity issues, we examine the response of banks' lending to agents' anxieties during anxious or recession quarters, while at the same time an institutional reform in the financial industry was implemented.[8] Clearly, such institutional reforms can be interpreted as exogenous positive supply shocks during these quarters, thus providing us with an ideal natural experiment to examine the response of banks' lending behavior to anxiety. Given that the main effects presumably now reflect pure supply shocks we do not include interaction terms with bank characteristics. Estimations are carried out with OLS and the results, reported in Table IX, show that each agent's anxiety is significant and enters with a negative sign, as expected.

Finally, to ensure that our results are not driven by the appraisal of current economic conditions but indeed by diminishing expectations about future economic outcomes, we

[8] These quarters are: (i) for anxious consumers—1998Q4 (Citigroup was formed on October 8, 1998 following the $140 billion merger of Citicorp and Travelers Group, on the expectation that Glass-Steagall would be repealed), and 2001Q1 (the Commodity Futures Modernization Act was fully implemented, enacted on December 21, 2000); (ii) for anxious CEOs—1994Q4 (the Riegle-Neal Interstate Banking and Branching Efficiency Act was enacted on September 29, 1994); (iii) for anxious banks—1998Q4, 2001Q1 (see above), and 2000Q1 (the Gramm-Leach-Bliley Act was fully implemented on November 12, 1999).

employ the Aruoba-Diebold-Scotti (2009) business conditions index.[9] In this respect, we deviate from our framework on the heterogeneous agents' expectations. We identify anxious quarters from this index based on the classification of the index's values over the 1985Q1–2010Q2 period into 8 quintiles and choose for our empirical exercise those quarters that have values of the index in the bottom four quintiles, that is, with values below -0.18. From this, we end up with 36 quarters out of which 12 are the quarters that correspond to the recession periods in our sample and the rest 24 are defined as anxiety quarters. Using these 24 quarters we re-estimate equation (1). The results, not reported here due to space considerations but available on request, show that the coefficients of all the interaction terms between the change in the index and bank characteristics are non-significant. Thus, it seems that the current economic situation does not drive bank's lending behavior but the expectations channel highlighted above does.

## V. Conclusions

In this paper, we examine empirically the lending behavior of banks during anxious periods of the economy. We define anxious periods from the perspective of consumers, firms (CEOs), and banks according to their perceptions and expectations on future economic conditions. Our results indicate that banks' lending responds differently to the anxieties of different agents. During all anxious periods identified in the period 1985–2010 in the US, the response of banks' lending to consumers' and banks' anxieties has a common denominator—credit risk. We contend that these results point to a new channel of the lending behavior of banks that can be termed the 'expectations channel.'

[9] The business conditions index is a real-time index, provided by the Federal Reserve Bank of Philadelphia and encompasses stock and flow information on several economic activity variables. This index is available on line at http://www.philadelphiafed.org/research-and-data/real-time-center/business-conditions-index. Here we use the quarterly averages for this index calculated in the middle of each quarter

More specifically, an increase in consumers' anxiety results in a drop in the supply of total loans, which is more significant for banks with more problem loans (primarily) and more provisions. On the other hand, banks do not seem to alter their lending decisions significantly with CEOs' anxiety, while problem loans are also the key mechanism that leads to a decrease in loan growth when banks are anxious themselves. Other bank characteristics, such as capitalization and liquidity are not driving the lending decisions of banks in anxious periods. Moreover, banks' anxiety in the period after 2001, seems to trigger intensified competition among larger banks in the supply of credit, as we identify that the negative effect of anxiety on loan growth is substantially weaker (if not turning positive) as bank size increases. This finding is important, as it suggests a moral-hazard mechanism working through expectations and provides an explanation for the developments that led to the financial crisis of 2007. 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 the lending behavior of banks is affected by consumers' and banks' anxieties, both of which are procyclical. 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, a notable finding is that there is considerable asymmetry between the impact of anxiety in periods that do not lead to recessions and the impact of anxiety in periods that actually lead to a crisis. Along with the evidence presented for the period after 2001, this finding provides evidence that the role of banks in the actual occurrence of a crisis is important.

## Appendix. Results on the Main Effects

The findings on the main effects of the regressions presented in Section III are consistent with expectations. In Table A.I we report the results on the main effects of the regressions

(1), (3), (5) and (7) of Table IV, which are the baseline results of the paper. The main effects of the rest of the estimated equations are available on request.

[Insert Table A.I here]

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. Remember that we have mean-centered all variables included in interaction effects. Consider for example the coefficient on *Δ in consumers' anxiety* = -0.067 (t-statistic = -4.58) in column (1). This coefficient measures the effect of a change in consumers' anxiety at time t-1 on loan growth at time t, at the mean value of *capitalization*, *liquidity*, *problem loans*, *provisions* and *size*.

The results show that banks with higher levels of capital today will increase their lending activity in the following year. This is expected as very high capital levels are expensive to hold and banks will use excess capital of the previous period to expand, *inter alia*, their lending. The same holds for liquidity only when consumers are anxious. A high level of provisions and non-performing loans imply lower loan growth. This shows that both these credit risk measures are needed into the empirical model and that a high level of credit risk today will signal a very risky position, so that 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 (lending rate) in the reduced-form equation is sensible.

More importantly, the main effects on the anxiety variables obtain values -0.067 (t-statistic = -4.58), -0.087 (t-statistic = -3.84) and -0.048 (t-statistic = -3.38) for regressions

(1), (2) and (3) of Table A.I, respectively. 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 verifies the quality of the three variables as indices capturing the anxiety of economic agents, and shows that the model is well-specified. Also, given the negative and significant effect of anxiety on loan growth, stemming from demand- and supply-side effects, the results are in-line with expectations.

Concerning the rest of the macroeconomic and regulatory control variables, we find that a positive change in industrial production in the previous quarter, affects positively the contemporaneous loan growth. In turn, the impact of the regulatory dummies shows that the introduction of a deposit insurance scheme in 1989 (regulatory dummy 1) increased loan growth. In the literature (e.g., Demirguc-Kunt and Detragiache, 2002), this is attributed to the increased security felt by banks due to the deposit insurance scheme or to the associated moral hazard mechanism, leading banks to expand lending or risk-taking. Further, the enactment of the "Interstate Banking and Branching Efficiency Act" in 1994, also exerted a strong positive effect on lending, through the abolition of geographic requirements and associated exploitation of economies of scale.

**Table A.I**
**Supplement to Table IV: Main effects of regressions**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Period type: | | Anxious | | Recessions |
| Agent type: | Consumers | CEOs | Banks | |
| Lagged dependent | -0.084* | -0.068** | -0.081** | -0.096** |
| | (-1.81) | (-2.11) | (-2.01) | (-2.33) |
| Capitalization | 0.221*** | 0.241*** | 0.262*** | 0.215*** |
| | (8.07) | (6.93) | (4.82) | (7.88) |
| Liquidity | 0.096*** | 0.045* | 0.021 | 0.145*** |
| | (3.87) | (1.88) | (0.57) | (5.13) |
| Problem loans | -0.422*** | -0.144 | -0.208*** | -0.519*** |
| | (-7.46) | (-0.64) | (-3.79) | (9.48) |
| Provisions | -0.006** | 0.004* | -0.054*** | -0.019*** |
| | (-2.36) | (1.71) | (-8.52) | (-3.28) |
| Size | -0.026*** | -0.023*** | -0.024*** | -0.028*** |
| | (-15.49) | (-18.33) | (-18.54) | (-17.92) |
| Δ in lending rate | -0.029*** | -0.014** | -0.027*** | -0.030*** |
| | (-3.14) | (-2.36) | (-3.10) | (-3.61) |
| Δ in industrial production | 0.655*** | 0.397 | 0.292*** | 0.728*** |
| | (12.57) | (7.97) | (5.71) | (13.55) |
| Regulatory dummy 1 | 0.022*** | 0.008*** | | 0.026*** |
| | (18.43) | (5.05) | | (16.47) |
| Regulatory dummy 2 | 0.009*** | 0.020*** | 0.007*** | 0.008*** |
| | (6.64) | (17.73) | (6.69) | (6.28) |
| Δ in consumers' anxiety | -0.067*** | | | -0.094*** |
| | (-4.58) | | | (-8.10) |
| Δ in CEOs' anxiety | | -0.087*** | | |
| | | (-3.84) | | |
| Δ in banks' anxiety | | | -0.048*** | |
| | | | (-3.38) | |
| Constant | 0.010*** | 0.008*** | 0.029*** | 0.010*** |
| | (7.84) | (6.20) | (20.07) | (7.45) |

Notes: The table reports the main effects of the regressions (1), (3), (5) and (7) of Table IV. The rest of the notes remain as in Table IV.

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**Table I**
**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 | FDIC Call Reports and own calculations |
| Δ in loans to individuals | Change in the natural logarithm of loans to individuals and households over the previous quarter | |
| Δ in commercial and industrial loans | Change in the natural logarithm of commercial and industrial loans over the previous quarter | |
| Δ in loans secured by real estate | Change in the natural logarithm of loans secured by real estate over the previous quarter | |
| **B. Explanatory variables** | | |
| *a) Bank-level variables** | | |
| Capitalization | The ratio of total equity capital to total assets | FDIC Call Reports and own calculations |
| Liquidity | The ratio of liquid assets (cash and short-term securities) to total assets | |
| Problem loans | The ratio of non-performing or problem loans to total loans | |
| Provisions | The ratio of provision for loan and lease losses to total loans | |
| Size | The natural logarithm of real total assets | |
| Δ in lending rate | The change over the previous quarter of the ratio of interest and fee income on loans to total loans | |
| *b) Variables characterizing the state of the economy* | | |
| Δ in industrial production volume | Change in the natural logarithm of the US industrial production volume over the previous quarter (data is seasonally adjusted) | Datastream |
| Δ in the Federal Funds rate | Change in the Federal funds rate over the previous quarter | |
| *c) Variables characterizing the anxiety of agents* | | |
| Δ in consumers' anxiety | Change in the natural logarithm of US consumer confidence over the previous quarter for:<br>a) Anxious periods, i.e. periods when the value of consumer confidence:<br>(i) declines for two consecutive quarters and the economy not being in a recession, or (alternatively)<br>(ii) declines in one quarter, its value in that quarter is below its mean value across the full sample and the economy not being in a recession.<br>b) Recessions, according to NBER dating | Datastream (The Conference Board) NBER |
| Δ in CEOs' anxiety | Change in the natural logarithm of US CEO confidence over the previous quarter for:<br>a) Anxious periods, i.e. periods when the value of CEO confidence:<br>(i) declines for two consecutive quarters and the economy not being in a recession, or (alternatively)<br>(ii) declines in one quarter, its value in that quarter is below its mean value across the full sample and the economy not being in a recession.<br>b) Recessions, according to NBER dating | |

**Table I (continued)**

| | | |
|---|---|---|
| Δ in banks' anxiety | Change in banks' terms of credit for commercial and industrial loans to medium and large firms for:<br>a) Anxious periods, i.e. periods when the value of banks' terms of credit:<br>(i) increases for two consecutive quarters and the economy not being in a recession, or (alternatively)<br>(ii) increases in one quarter, its value in that quarter is above its mean value across the full sample and the economy not being in a recession.<br>b) Recessions, according to NBER dating | Senior Loan Officer Opinion Survey, Federal Reserve<br>NBER |
| *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 | Sherman, M. (2009) |
| 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 | |

**Table II**
**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 |
| Lending rate | 1,052,338 | 0.06 | 1.23 | 0.01 | 0.23 |
| Industrial production volume | 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 terms of credit | 805,744 | 9.51 | 23.76 | -24.1 | 83.6 |

Notes: Sample period is 1985Q1-2010Q2 (for bank terms of credit the sample period is 1990Q2-2010Q2). 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 I and values are in thousands USD.

**Table III**
**Correlation matrix**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (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) Lending rate | 0.02 | 0.02 | 0.03 | 0.66 | -0.00 | 1.00 | | | | | |
| (7) Industrial production | 0.14 | -0.10 | -0.11 | 0.00 | 0.23 | -0.00 | 1.00 | | | | |
| (8) Consumer confidence | 0.06 | -0.11 | -0.04 | -0.00 | -0.00 | -0.00 | 0.35 | 1.00 | | | |
| (9) CEO confidence | -0.03 | 0.03 | -0.00 | -0.00 | -0.02 | -0.00 | -0.18 | -0.11 | 1.00 | | |
| (10) Bank terms of credit | -0.00 | 0.04 | 0.03 | 0.00 | 0.02 | 0.00 | 0.08 | -0.17 | -0.60 | 1.00 | |
| (11) Federal funds rate | -0.04 | -0.03 | 0.05 | 0.00 | -0.15 | 0.00 | -0.35 | 0.52 | -0.40 | 0.05 | 1.00 |

Notes: The table presents correlation coefficients for the full sample between the main explanatory variables of the study. The variables are defined in Table I.

**Table IV**
**The response of total loan supply growth to agents' anxiety during anxious periods and recessions**

| Period type: | Anxious Periods | | | | | | Recessions | | |
|---|---|---|---|---|---|---|---|---|---|
| Agent's anxiety type: | Consumers | | CEOs | | Banks | | Consumers | CEOs | Banks |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| 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 quarters | 18 | 19 | 18 | 13 | 14 | 9 | 12 | 12 | 12 |
| 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 of the interaction terms from equation (1) and their 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 I. The sample for each equation includes pools of quarters over the period 1985Q1-2010Q2 according to whether each agent considered is anxious. For all agents higher values on the respective indices reflect higher anxiety. Columns (1), (3) and (5) 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, while the economy is not in a recession". Columns (2), (4) and (6) report the results with anxious periods defined as "one quarter decline in the value of the variable measuring the confidence of the respective agent, this variable being below its sample mean and the economy not being in a recession". Estimation method is limited information maximum likelihood. ***, ** and * denote statistical significance at the 1, 5 and 10% level, respectively.

**Table V**
**The response of total loan supply growth during specific anxious periods**

| Period type: | Anxious periods that led to recessions | | | Anxious periods after 2001Q4 | | |
|---|---|---|---|---|---|---|
| Agent's anxiety type: | Consumers | CEOs | Banks | Consumers | CEOs | Banks |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Δ in agents' anxiety* capitalization | 0.035 | 0.023 | -0.051** | 0.376 | -0.227 | -3.748 |
| | (1.422) | (1.492) | (-2.034) | (1.301) | (-0.683) | (-0.890) |
| Δ in agents' anxiety* liquidity | 0.005 | 0.012 | -0.011 | 0.418 | 0.010 | -1.816 |
| | (0.298) | (1.291) | (-0.487) | (1.419) | (0.031) | (-0.789) |
| Δ in agents' anxiety* problem loans | 0.195** | -0.065 | 0.125* | 0.677 | 16.416 | 1.172 |
| | (2.547) | (-0.920) | (1.820) | (0.544) | (1.125) | (0.149) |
| Δ in agents' anxiety* provisions | 0.000 | 0.000 | -0.012 | -2.794 | 7.845*** | -20.916 |
| | (0.092) | (0.060) | (-1.226) | (-0.832) | (2.972) | (-1.354) |
| Δ in agents' anxiety* size | 0.000 | -0.000** | 0.001*** | 0.027*** | 0.013 | 0.009 |
| | (0.275) | (-2.368) | (3.922) | (4.687) | (0.861) | (0.172) |
| Constant | 0.265*** | 0.253*** | 0.250*** | 0.602*** | 0.566*** | 1.164*** |
| | (31.712) | (31.478) | (30.783) | (7.173) | (7.978) | (3.615) |
| Observations | 17,032 | 10,498 | 10,121 | 55,046 | 62,579 | 22,711 |
| Number of quarters | 5 | 2 | 2 | 6 | 7 | 3 |
| R-squared | 0.149 | 0.145 | 0.147 | 0.169 | 0.172 | 0.150 |

Notes: The table reports coefficients of the interaction terms from equation (1) and their 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 I. The sample for each equation includes pools of quarters over the period 1985Q1-2010Q2 according to whether each agent considered is anxious. For all agents higher values on the respective indices reflect higher anxiety. Anxious periods are defined as "two consecutive quarters decline in the value of the variable measuring the confidence of the respective agent and the economy is not in a recession". Estimation method is limited information maximum likelihood. ***, ** and * denote statistical significance at the 1, 5 and 10% level, respectively.

**Table VI**
**The response of loan supply growth for different loan categories during anxious periods**

| Dependent variable: | Panel A: Δ in loans to individuals and households | | | Panel B: Δ in commercial and industrial loans | | | Panel C: Δ in loans secured by real estate | | |
|---|---|---|---|---|---|---|---|---|---|
| Agent's anxiety type: | Consumers | CEOs | Banks | Consumers | CEOs | Banks | Consumers | CEOs | Banks |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| 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 quarters | 18 | 18 | 14 | 18 | 18 | 14 | 18 | 18 | 14 |
| 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 of the interaction terms from equation (1) and their t-statistics (in parentheses). The dependent variables are given on the first line of the table. The explanatory variables are defined in Table I. The sample for each equation includes pools of quarters over the period 1985Q1-2010Q2 according to whether each agent considered is anxious. For all agents higher values on the respective indices reflect higher anxiety. Anxious periods are defined as "two consecutive quarters decline in the value of the variable measuring the confidence of the respective agent and the economy is not in a recession". Estimation method is limited information maximum likelihood. ***, ** and * denote statistical significance at the 1, 5 and 10% level, respectively.

**Table VII**
**The response of total loan supply growth during anxious periods for large and very large banks**

| Agent's anxiety type: | Top 25% banks | | | Top 5% banks | | |
|---|---|---|---|---|---|---|
| | Consumers | CEOs | Banks | Consumers | CEOs | Banks |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| 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 quarters | 18 | 18 | 14 | 18 | 18 | 14 |
| R-squared | 0.192 | 0.202 | 0.188 | 0.195 | 0.209 | 0.193 |

Notes: The table reports coefficients of the interaction terms from equation (1) and their 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 I. The sample for each equation includes pools of quarters over the period 1985Q1-2010Q2 according to whether each agent considered is anxious. For all agents higher values on the respective indices reflect higher anxiety. Anxious periods are defined as "two consecutive quarters decline in the value of the variable measuring the confidence of the respective agent and the economy is not in a recession". Estimation method is limited information maximum likelihood. ***, ** and * denote statistical significance at the 1, 5 and 10% level, respectively.

**Table VIII**
**Sensitivity analysis I**

| | Whole sample period | | | GMM estimates | Only 2001Q4 |
|---|---|---|---|---|---|
| Confidence type: | Consumers | CEOs | Banks | Consumers | Consumers |
| | (1) | (2) | (3) | (4) | (5) |
| Δ in agents' confidence* capitalization | -0.048 | -0.095** | 0.038 | -0.622 | -0.560 |
| | (-0.646) | (-2.007) | (1.306) | (-1.497) | (-0.808) |
| Δ in agents' confidence* liquidity | 0.009 | 0.020 | -0.014 | 0.006 | 0.037 |
| | (0.203) | (0.374) | (-0.670) | (0.056) | (0.277) |
| Δ in agents' confidence* problem loans | -1.489 | -0.329** | -0.128* | -1.223*** | -1.336*** |
| | (-1.402) | (-1.967) | (-1.897) | (-3.120) | (-3.394) |
| Δ in agents' confidence* provisions | 0.168* | 0.026** | -0.006 | -0.111** | -0.189*** |
| | (1.781) | (2.391) | (-0.132) | (-2.465) | (-2..788) |
| Δ in agents' confidence* size | 0.013*** | 0.012*** | 0.003*** | 0.000 | 0.002 |
| | (11.315) | (11.649) | (7.475) | (0.027) | (0.458) |
| 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*** |
| | (31.848) | (31.629) | (19.925) | (19.333) | (14.646) |
| Observations | 974,194 | 974,194 | 703,727 | 195,165 | 8,670 |
| Number of Quarters | 102 | 102 | 81 | 18 | 1 |
| R-squared | 0.188 | 0.184 | 0.176 | 0.142 | 0.284 |

Notes: The table reports coefficients of the interaction terms from equation (1) and their 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 I. In columns (1)-(3) the federal funds rate and its interaction terms with bank characteristics also enter equation (1) and the regressions are run on the full sample period (1985Q1-2010Q2). For column (4) the sample includes pools of quarters over the period 1985Q1-2010Q2 in which consumers are anxious. For column (5) only 2001Q4 is used. For columns (4) and (5) the consumers' anxiety variable is employed instead of consumers' confidence. For all agents higher values on the respective indices reflect higher anxiety. Anxious periods are defined as "two consecutive quarters decline in the value of the variable measuring the confidence of the respective agent and the economy is not in a recession" For columns (1)-(3) estimation method is limited information maximum likelihood, for column (4) the GMM of Blundell and Bond and for column (5) OLS. ***, ** and * denote statistical significance at the 1, 5 and 10% level, respectively.

**Table IX**
**Sensitivity analysis II**

| Confidence type: | Whole sample period | | |
|---|---|---|---|
| | Consumers | CEOs | Banks |
| | (1) | (2) | (3) |
| Δ in consumers' anxiety | -0.006*** | | |
| | (-6.594) | | |
| Δ in CEOs' anxiety | | -0.001* | |
| | | (-1.657) | |
| Δ in banks' anxiety | | | -0.008*** |
| | | | (-9.203) |
| Constant | 0.253*** | 0.256*** | 0.253*** |
| | (-31.169) | (-31.428) | (-31.258) |
| Observations | 14,342 | 8,021 | 18,905 |
| Number of Quarters | 2 | 1 | 3 |
| R-squared | 0.144 | 0.168 | 0.188 |

Notes: The table reports coefficients of the main effects of the anxiety variables from equation (1) and their t-statistics (in parentheses). Interaction effects are not employed in these regressions. Dependent variable is the change in the natural logarithm of total loans over the previous quarter. The explanatory variables are defined in Table I. The sample for each equation includes quarters where a regulatory change occurred in the US banking industry. For all agents higher values on the respective indices reflect higher anxiety. Anxious periods defined as "two consecutive quarters decline in the value of the variable measuring the confidence of the respective agent, while the economy is not in a recession". Estimation method is OLS. ***, ** and * denote statistical significance at the 1, 5 and 10% level, respectively.

**Figure 1**

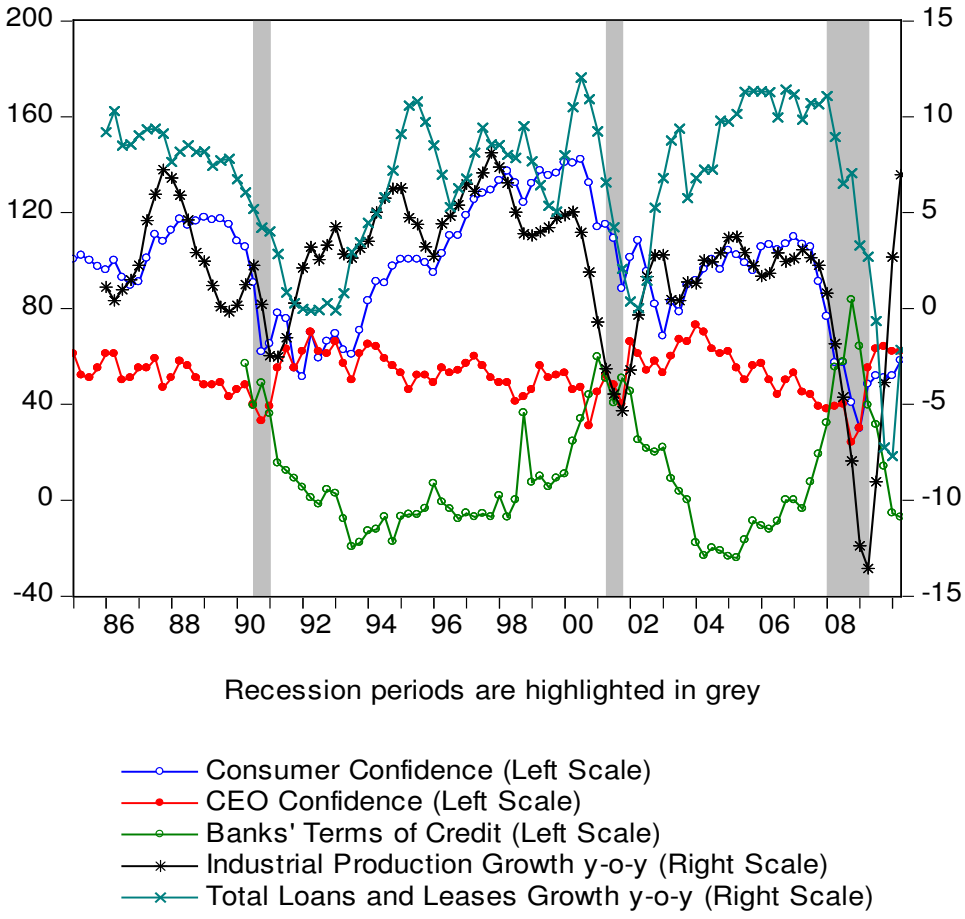
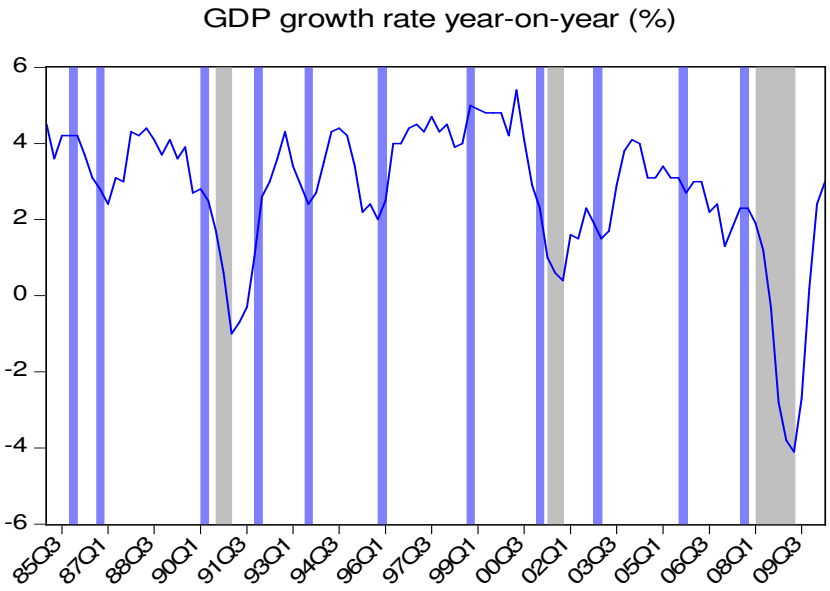
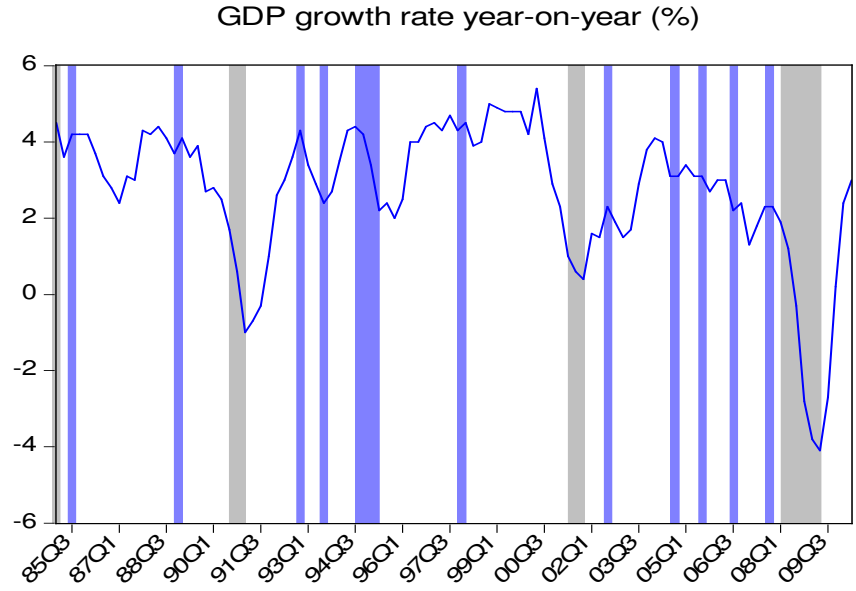



**Figure 2**



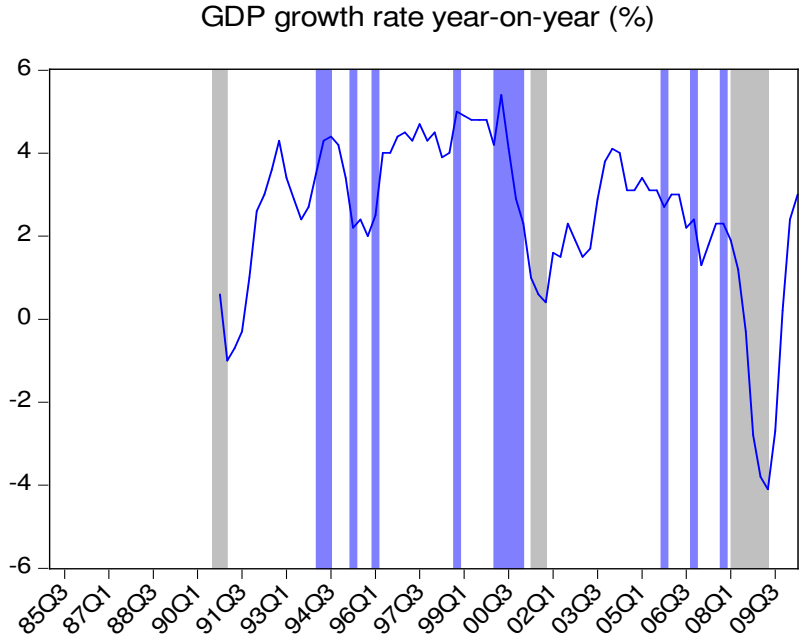

Anxious Periods Based on Two Consequtive Quarters Falling Consumers' Confidence
Recession Periods are Highlighted in Grey

## 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