Credit Cycles, Credit Risk, and Prudential Regulation

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This paper finds strong empirical support of a positive, although quite lagged, relationship between rapid credit growth and loan losses. Moreover, it contains empirical evidence of more lenient credit standards during boom periods, both in terms of screening of borrowers and in collateral requirements. We find robust evidence that during upturns, riskier borrowers get bank loans, while collateralized loans decrease. We develop a regulatory prudential tool, based on a countercyclical, or forward-looking, loan loss provision that takes into account the credit risk profile of banks' loan portfolios along the business cycle. Such a provision might contribute to reinforce the soundness and the stability of banking systems.

JEL Codes: E32, G18, G21.

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1. Introduction

Banking supervisors, after many painful experiences, are quite convinced that banks' lending mistakes are more prevalent during upturns than in the midst of a recession.[1] In good times both borrowers and lenders are overconfident about investment projects and their ability to repay and to recoup their loans and the corresponding fees and interest rates. Banks' overoptimism about borrowers' future prospects, coupled with strong balance sheets (i.e., capital well above minimum requirements) and increasing competition, brings about more liberal credit policies with lower credit standards.[2] Thus, banks sometimes finance negative net present value (NPV) projects only to find later that the loan becomes impaired or the borrower defaults. On the other hand, during recessions—when banks are flooded with nonperforming loans, high specific provisions, and tighter capital buffers—banks suddenly turn very conservative and tighten credit standards well beyond positive net present values. Only their best borrowers get new funds; thus, lending during downturns is safer and credit policy mistakes much lower. Across many jurisdictions and at different points in time, bank managers seem to overweight concerns regarding type 1 lending policy errors (i.e., good borrowers not getting a loan) during economic booms and underweight type 2 errors (i.e., bad borrowers getting financed). The opposite happens during recessions.

Several explanations have appeared in the literature to rationalize fluctuations in credit policies. First of all, the classic principal-agency problem between bank shareholders and managers can feed excessive volatility into loan growth rates. Once managers obtain a reasonable return on equity for their shareholders, they may engage in other activities that depart from the firm's value maximization and focus more on their own rewards. One of these activities might be excessive credit growth in order to increase the social presence of the bank (and its managers) or the power of managers in a continuously enlarging organization (Williamson 1963). If managers are

[1]See, for instance, Caruana (2002), Ferguson (2004), and the numerous joint announcements by U.S. bank regulators in the late nineties warning U.S. banks to tighten credit standards.

[2]A loose monetary policy can also contribute to overoptimism through excess liquidity provision.

rewarded more in terms of growth objectives instead of profitability targets, incentives to rapid growth may result. This has been documented previously by the expense preference literature and, more recently, by the literature that relates risk and managers' incentives.[3]

Strong competition among banks or between banks and other financial intermediaries erodes margins as both loan and deposit interest rates get closer to the interbank rate. To compensate for the fall in profitability, bank managers might increase loan growth at the expense of the (future) quality of their loan portfolios. Excess capacity in the banking industry is being built up. Nevertheless, that will not impact immediately on problem loans, so it might encourage further loan growth.

In a more formalized framework, Van den Heuvel (2002) shows that the combination of risk-based capital requirements, an imperfect market for bank equity, and a maturity mismatch in banks' balance sheets gives rise to a bank capital channel of monetary policy. In boom periods, when banks show strong balance sheets and capital buffers, they overlend. However, as the expansion heads to its end, the surge in loan portfolios has eroded much of the capital buffer; at that point, a monetary shock may trigger a decline in bank profits, stringent capital ratios, and a tightening of lending standards and, subsequently, of loans available to firms and households.[4]

Herd behavior (Rajan 1994) might also help to explain why bank managers finance negative NPV projects during expansions. Credit mistakes are judged more leniently if they are common to the whole industry. Moreover, a manager whose bank systematically loses market share and underperforms its competitors in terms of earnings growth increases his or her probability of being fired. Thus, managers have a strong incentive to behave as their peers, which, at an aggregate level, enhances lending booms and recessions. Short-term objectives are prevalent and might explain why banks finance projects during expansions that, later on, will become nonperforming loans.

Berger and Udell (2004) have developed the so-called institutional memory hypothesis in order to explain the markedly cyclical

[3]For the former, see (among others) Edwards (1977), Hannan and Mavinga (1980), Akella and Greenbaum (1988), and Mester (1989). For the latter, see Saunders, Strock, and Travlos (1990), Gorton and Rosen (1995), and Esty (1997).

[4]Ayuso, Pérez, and Saurina (2004) find evidence of this cyclical behavior of capital buffers.

profile of loans and nonperforming loan losses. It states that as time passes since the last loan bust, loan officers become less and less skilled to grant loans to high-risk borrowers. That might be the result of two complementary forces. First, the proportion of loan officers that experienced the last bust decreases as the bank hires new, younger employees and the former ones retire. Thus, there is a loss of learning experience. Second, some of the experienced officers may forget the lessons of the past, especially as more years go by and the former recession becomes a more distant memory.[5]

Finally, collateral might also play a role in fueling credit cycles. Usually, loan booms are intertwined with asset booms.[6] Rapid increases in land, house, or share prices increase the availability of funds for those who can pledge such assets as collateral. At the same time, the bank is more willing to lend since it has an (increasingly worthier) asset to back the loan in case of trouble. On the other hand, it could be possible that the widespread confidence among bankers results in a decline in credit standards, including the need to pledge collateral. Collateral, as risk premium, can be thought to be a signal of the degree of tightening of individual bank loan policies.[7]

Despite the theoretical developments and the banking supervisors' experiences, the empirical literature providing evidence of the link between rapid credit growth and loan losses is scant.[8] In this paper we produce clear evidence of a direct, although lagged, relationship between credit cycle and credit risk.[9] A rapid increase in loan portfolios is positively associated with an increase in nonperforming loan ratios later on. Moreover, those loans granted during

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[5]Kindleberger (1978) contains the idea of fading bad experiences among economic agents.

[6]See Borio and Lowe (2002), Davis and Zhu (2004), and Goodhart, Hofmann, and Segoviano (2005).

[7]The Federal Reserve Board's Senior Loan Officer Opinion Survey on Bank Lending Practices shows the cyclical nature of bank lending standards, loan demand, and loan spreads. Asea and Blomberg (1998) find, with bank-level variables, that the probability of collateralization increases during contractions and decreases during expansions in the United States.

[8]Clair (1992), Keeton (1999), and Salas and Saurina (2002) are a few exceptions.

[9]Goodhart, Hofmann, and Segoviano (2005) document that credit over GDP is a good predictor of future defaults. Dell'Ariccia and Marquez (forthcoming) predict that episodes of financial distress are more likely in the aftermath of periods of strong credit expansion.

boom periods have a higher probability of default than those granted during periods of slow credit growth. To our knowledge, this is the first time that such an empirical study, based on loan-by-loan information, relating credit-cycle phase and future problem loans is being carried out. Finally, we show that in boom periods collateral requirements are relaxed, while the opposite happens in recessions, which we take as evidence of looser credit standards during expansions.

The three empirical avenues provide similar results: In boom periods, when lending accelerates, the seeds for problem loans are being sown. During recession periods, when banks curtail credit growth, they become much more cautious, both in terms of the quality of the borrowers and the loan conditions. Therefore, banking supervisors' concerns are well rooted both in theoretical and empirical grounds and deserve careful scrutiny and a proper answer by regulators. We call the former findings procyclicality of ex ante credit risk, as opposed to the behavior of ex post credit risk (i.e., nonperforming loans), which increases during recessions and declines in good periods.[10] The issue here is to realize that lending policy mistakes occur in good times; thus, a prudential response from the supervisor might be needed at those times.

We develop a new regulatory devise specifically designed to cope with procyclicality of ex ante credit risk. It is a countercyclical, or forward-looking, loan loss provision that takes into account the former empirical results. Spain already had a dynamic provision (the so-called statistical provision) with a clear prudential bias (Fernández de Lis, Martínez Pagés, and Saurina 2000). The main criticism to that provision (coming from accountants, not from banking supervisors) was that resulting total loan loss provisions were excessively "flat" through an entire economic cycle. Although it shares the prudential concern of the statistical provision, the new proposal does not achieve, by construction, a flat loan loss provision through the cycle. Instead, total loan loss provisions are still higher in recessions, but they are also significant when credit policies are the most lax and therefore credit risk (according to supervisors' experiences and our empirical findings) is entering at a high speed on bank loan portfolios. By making a concrete proposal, we would like

[10] A thorough discussion of banking regulatory tools to cope with procyclicality of the financial system is in Borio, Furfine, and Lowe (2001).

to open a debate on banking regulatory tools that can contribute to dampen business-cycle fluctuations and, thus, to enhance financial stability.

The rest of the paper is organized as follows. Section 2 provides the empirical evidence on credit cycles and credit risk. Section 3 explains the rationale and workings of the new regulatory tool through a simulation exercise. Section 4 contains a policy discussion, and section 5 concludes.

2. Empirical Evidence on Lending Cycles and Credit Risk

2.1 Problem Loan Ratios and Credit Growth

Salas and Saurina (2002) model problem loan ratios as a function of both macro- and microvariables (i.e., bank balance sheet variables). They find that lagged credit growth has a positive and significant impact on ex post credit risk measures. Here, we follow that paper in order to disentangle the relationship between past credit growth and current problem loans. Although in spirit the methodology is similar, there are some important differences worth pointing out. First of all, we use a longer period, which allows us to consider two lending cycles of the Spanish economy. Secondly, we focus more on loan portfolio characteristics (industry and regional concentration and importance of collateralized loans) of the bank rather than on balance sheet variables, which are much more general and difficult to interpret. For that, we take advantage of the information contained in the Central Credit Register (CCR) database run by Banco de España.[11] The equation we estimate is the following:

$$\begin{aligned} NPL_{it} = {} & \alpha NPL_{it-1} + \beta_1 GDPG_t + \beta_2 GDPG_{t-1} + \beta_3 RIR_t \\ & + \beta_4 RIR_{t-1} + \delta_1 LOANG_{it-2} + \delta_2 LOANG_{it-3} \\ & + \delta_4 LOANG_{it-4} + \chi_1 HERFR_{it} + \chi_2 HERFI_{it} \\ & + \phi_1 COLIND_{it} + \phi_2 COLFIR_{it} + \omega SIZE_{it} + \eta_i + \varepsilon_{it}, \end{aligned} \quad (1)$$

[11] Any loan above €6,000 granted by any bank operating in Spain must be reported to the CCR. A detailed description of the CCR content can be found in Jiménez and Saurina (2004) and Jiménez, Salas, and Saurina (forthcoming).

where NPL_{it} is the ratio of nonperforming loans over total loans for bank i in year t. In fact, we estimate the logarithmic transformation of that ratio (i.e., $\ln(NPL_{it}/(100 - NPL_{it}))$) in order to not curtail the range of variation of the endogenous variable. Since problem loans present a lot of persistence, we include the left-hand-side variable in the right-hand side lagged one year. We control for the macroeconomic determinants of credit risk (i.e., common shocks to all banks) through the real rate of growth of the gross domestic product ($GDPG$) and the real interest rate (RIR), proxied as the interbank interest rate less the inflation of the period. Both variables are included contemporaneously as well as lagged one year since some of the impacts might take some time to appear.

Our variable of interest is the loan growth rate, lagged two, three, and four years. A positive and significant parameter for those variables will be empirical evidence supporting the prudential concerns of banking regulators since the swifter the loan growth, the higher the problem loans in the future.

Moreover, we control for risk-diversification strategies of each bank through the inclusion of two Herfindahl indexes (one for region, $HERFR$, and the other for industry, $HERFI$). We also include as a control variable the size of the bank ($SIZE$)—that is, the market share of the bank in each period of time. Equation (1) also takes into account the specialization of the bank in collateralized loans, distinguishing between those of firms ($COLFIR$) and those of households ($COLIND$).

Finally, η_i is a bank fixed effect to control for idiosyncratic characteristics of each bank, constant along time. It might reflect the risk profile of the bank, the way of doing business, etc. ε_{it} is a random error. We estimate model 1 in first differences in order to prevent from biasing the results due to a possible correlation between unobservable bank characteristics and some of the right-hand-side variables. Given that some of the explanatory variables might be determined at the same time as the left-hand-side variable, we use a GMM estimator (Arellano and Bond 1991).

All the information from each individual bank comes from the CCR. Table 1 contains the descriptive statistics of the variables. The period analyzed covers two credit cycles of the Spanish banking sector (from 1984 to 2002), with an aggregate maximum for *NPL* around 1985 and, again, in 1993. We focus on commercial

Table 1. Descriptive Statistics

Variable	Mean	St. Dev.	Min.	Max.
NPL_{it}	3.94	5.70	0.00	99.90
$GDPG_t$	2.90	1.51	−1.03	4.83
RIR_t	4.14	2.90	−0.67	8.12
$LOANG_{i,t-2}$	17.36	14.37	−17.29	71.97
$LOANG_{i,t-3}$	17.37	13.93	−13.80	67.82
$LOANG_{i,t-4}$	17.54	14.09	−11.10	64.68
$HERFR_{it}$	52.68	24.86	11.26	98.87
$HERFI_{it}$	18.47	9.82	7.45	70.26
$COLIND_{it}$	19.25	16.28	0.00	69.91
$COLFIR_{it}$	20.47	12.89	0.00	70.35
$SIZE_{it}$	0.59	1.05	0.00	8.79

Note: NPL_{it} is the nonperforming loan ratio—that is, the quotient between nonperforming loans and total loans. $GDPG_t$ is the real rate of growth of gross domestic product. RIR_t is the real interest rate, calculated as the interbank interest rate less the inflation of the period. $LOANG_{it}$ is the rate of the growth of loans for bank i. $HERFR_{it}$ is the Herfindahl index of bank i in terms of the amount lent to each region. $HERFI_{it}$ is the Herfindahl index of bank i in terms of the amount lent to each industry. $COLIND_{it}$ is the percentage of fully collateralized loans to households over total loans for bank i. $COLFIR_{it}$ is the percentage of fully collateralized loans to firms over total loans for bank i. $SIZE_{it}$ is the market share of bank i. All variables are shown in percentage points. i denotes the bank and t denotes the year.

and savings banks, which represent more than 95 percent of total assets among credit institutions (only small credit cooperatives and specialized financial firms are left aside). Some outliers have been eliminated in order to avoid the possibility that a small number of observations, with a very low relative weight over the total sample, could bias the results. Thus, we have eliminated those extreme loan growth rates (i.e., banks with a loan growth rate lower or higher than the 5th and 95th percentile, respectively).

Results appear in the first column of table 2 (labeled "Model 1"). As expected, since we take first differences of equation (1) and ε_{it} is white noise, there is first-order residual autocorrelation and

Table 2. GMM Estimation Results of Equation (1) Using DPD (Arellano and Bond 1991)

	Model 1		**Model 2**		**Model 3**		**Model 4**	
Variables	**Coefficient**	**SE**	**Coefficient**	**SE**	**Coefficient**	**SE**	**Coefficient**	**SE**
$NPL_{i,t-1}$	0.5524	0.0887***	0.5520	0.0889***	0.5499	0.0841***	0.5447	0.0833***
Macroeconomic Characteristics								
$GDPD_t$	−0.0631	0.0135***	−0.0654	0.0137***	−0.0709	0.0131***	−0.0716	0.0134***
$GDPG_{t-1}$	−0.0771	0.0217***	−0.0770	0.0220***	−0.0750	0.0212***	−0.0777	0.0209***
RIR_t	0.0710	0.0194***	0.0703	0.0193***	0.0704	0.0195***	0.0711	0.0192***
RIR_{t-1}	0.0295	0.0103***	0.0292	0.0103***	0.0262	0.0098***	0.0263	0.0101***
Bank Characteristics								
$LOANG_{i,t-2}$	−0.0008	0.0013	−0.0008	0.0013				
$LOANG_{i,t-3}$	0.0018	0.0012	0.0018	0.0012				
$LOANG_{i,t-4}$ (α)	0.0034	0.0012***	0.0029	0.0012**				
$\lvert LOANG_{i,t-2} - AVERAGE\ LOANG_i \rvert$			0.0004	0.0017				
$\lvert LOANG_{i,t-3} - AVERAGE\ LOANG_i \rvert$			−0.0005	0.0016				
$\lvert LOANG_{i,t-4} - AVERAGE\ LOANG_i \rvert$ (β)			0.0025	0.0019				
$LOANG_{i,t-2} - AVERAGE\ LOANG_t$					0.0007	0.0012	0.0011	0.0013
$LOANG_{i,t-3} - AVERAGE\ LOANG_t$					0.0015	0.0013	0.0014	0.0014
$LOANG_{i,t-4} - AVERAGE\ LOANG_t$ (α)					0.0025	0.0013**	0.0020	0.0013

(*continued*)

Table 2 (continued). GMM Estimation Results of Equation (1) Using DPD (Arellano and Bond 1991)

	Model 1		Model 2		Model 3		Model 4	
Variables	**Coefficient**	**SE**	**Coefficient**	**SE**	**Coefficient**	**SE**	**Coefficient**	**SE**
Bank Characteristics (continued)								
$\lvert LOANG_{i,t-2} - AVERAGE\ LOANG_t \rvert$							−0.0026	0.0018
$\lvert LOANG_{i,t-3} - AVERAGE\ LOANG_t \rvert$							0.0017	0.0017
$\lvert LOANG_{i,t-4} - AVERAGE\ LOANG_t \rvert$ (β)							0.0029	0.0018
$HERFR_{it}$	0.0212	0.0096**	0.0209	0.0097**	0.0207	0.0098**	0.0218	0.0099**
$HERFI_{it}$	−0.0032	0.0094	−0.0025	0.0095	−0.0038	0.0098	−0.0026	0.0097
$COLFIR_{it}$	0.0034	0.0063	0.0034	0.0063	0.0034	0.0065	0.0046	0.0065
$COLIND_{it}$	−0.0125	0.0072*	−0.0125	0.0072*	−0.0141	0.0073*	−0.0141	0.0074*
$SIZE_{it}$	0.0199	0.0482	0.0153	0.0486	0.0213	0.0475	0.0261	0.0484
Time Dummies	No		No		No		No	
No. Observations	868		868		868		868	
Time Period	1984–2002		1984–2002		1984–2002		1984–2002	
Sargan Test $[\chi(2)_{138}]$/p-value	124.76	0.78	125.56	0.77	123.85	0.80	122.86	0.82
First-Order Autocorrelation (m_1)	−5.43		−5.37		−5.36		−5.28	
Second-Order Autocorrelation (m_2)	−1.27		−1.4		−1.34		−1.24	
Test Asymmetric Impact (p-value)								
$\alpha + \beta = 0$	—		0.01		—		0.01	
$\alpha - \beta = 0$	—		0.84		—		0.73	

Note: See note in table 1 for a description of the variables. NPL_{it}, $HERFR_{it}$, $HERFI_{it}$, $COLFIR_{it}$, and $COLIND_{it}$ are treated as endogenous using three lags for NPL_{it} and two for the others. Robust SE reported. *, **, and *** are significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

not second order. A Sargan test of validity of instruments is also fully satisfactory. The results of the estimation are robust to heteroskedasticity.

Regarding the explanatory variables, there is persistence in the *NPL* variable. The macroeconomic control variables are both significant and have the expected signs. Thus, the acceleration of GDP, as well as a decline in real interest rates, brings about a decline in problem loans. The impact of interest rates is much more rapid than that of economic activity. The more concentrated the credit portfolio in a region, the higher the problem loan ratio, while industry concentration is not significant. Collateralized loans to households are less risky (10 percent level of significance), mainly because these are mortgages that, in Spain, have the lowest credit risk. The parameter of the collateralized loans to firms, although positive, is not significant. The size of the bank does not have a significant impact on the problem loan ratio.

Finally, regarding the variables that are the focus of our paper, the rate of loan growth lagged four years is positive and significant (at the 1 percent level). The loan growth rate lagged three years is also positive, although not significant. Therefore, rapid credit growth today results in lower credit standards that, eventually, bring about higher problem loans.

The economic impact of the explanatory variables is significant. The long-run elasticity of GDP growth rate, evaluated at the mean of the variables, is -1.19; that is, an increase of 1 percentage point in the rate of GDP growth (i.e., GDP grows at 3 percent instead of at 2 percent) decreases the *NPL* ratio by 30.1 percent (i.e., it declines from 3.94 percent to 2.75 percent). For interest rates, a 100-basis-point increase brings about a rise in the *NPL* ratio of 21.6 percent. Regarding loan growth rates, an acceleration of 1 percent in the growth rate has a long-term impact of a 0.7 percent higher problem loan ratio.

We have performed numerous robustness tests. Model 2 (the second column of table 2) tests for the asymmetric impact of loan expansions and contractions. We augment model 1 with the absolute value of the difference between the loan credit growth of bank i in year t and its average over time. All model 1 results hold, but it can be seen that there is some asymmetry: rapid credit growth of a bank (i.e., above its own average loan growth) increases nonperforming loans, while slow growth (i.e., below average) has no significant impact on problem loans.[12] If instead of focusing on credit growth of bank i (either alone or compared to its average growth rate over time), we look at the relative position of bank i in respect to the rest of the banks at a point in time (i.e., at each year t), we find that the relative loan growth rate lagged four years still has a positive and significant impact on bank i's *NPL* ratio (model 3, third column of table 2). The parameter of relative credit growth lagged three years is positive but not significant. The rest of the variables keep their sign and significance. Model 4 (the last column of table 2) shows that there is asymmetry in the response of nonperforming loans to credit growth. When banks expand their loan portfolios at a speed above the average of the banking sector, future nonperforming loans increase, while there is no significant effect if the loan growth is below the average.[13] Finally, the former results are robust to changes in the macroeconomic control variables (not shown). If we substitute time dummies for the change in the GDP growth rate and for the real interest rate, the loan growth rate is still positive and significant in lag 4 (although at the 10 percent level) and, again, positive (although not significant) in lag 3.

All in all, we find a robust statistical relationship between rapid credit growth at each bank portfolio and problem loans later on. The lag is around four years, so bank managers and short-term investors (including shareholders) might have incentives to foster credit growth today in order to reap short-term benefits to the expense of long-term bank stakeholders, including depositors, the deposit guarantee fund, and banking supervisors.

2.2 Probability of Default and Credit Growth

Instead of focusing on bank-aggregated-level credit risk measures, in this section we analyze the probability of default at an individual

[12]Note that in model 1, regression results are the same for the variable rate of growth of loans in bank i at year t as they are for the difference between the former variable and the average rate of growth of loans of bank i along time. That is because the latter term is constant over time for each bank and disappears when we take first differences in equation (1).

[13]Note that the relevant test here is to test if $\alpha + \beta$ (and $\alpha - \beta$) is significant, not each of them alone.

loan level and its relation to the cyclical position of the bank credit policy. The hypothesis is that, for the reasons explained in section 1 above, those loans granted during credit booms are riskier than those granted when the bank is reining in loan growth. That would provide a rigorous empirical microfoundation for prudential regulatory devises aimed at covering the losses embedded in policies regarding rapid credit growth.

In order to test the former hypothesis, we use individual loan data from the CCR. We focus on new loans granted to nonfinancial firms with a maturity larger than one year and keep track of them the following years. We study only financial loans (i.e., excluding receivables, leasing, etc.), which are 60 percent of the total loans to nonfinancial firms in the CCR, granted by commercial and savings banks. The equation estimated is

$$\begin{aligned}\Pr(DEFAULT_{ijt+k} = 1) &= F(\theta + \alpha(LOANG_{it} - averageLOANG_i) \\ &+ \beta\left|LOANG_{it} - averageLOANG_i\right|\chi LOANCHAR_{iit} \\ &+ \delta_1 DREG_i + \delta_2 DIND_i + \delta_3 BANKCHAR_{it} + \varphi_t + \eta_i), \qquad (2)\end{aligned}$$

where we model the probability of default of loan j, in bank i, some k years after being granted (i.e., at $t+2$, $t+3$, and $t+4$)[14] as a logistic function $[F(x) = 1/(1 + exp(-x))]$ of the characteristics of that loan (*LOANCHAR*), such as its size, maturity (i.e., between one and three years and more than three years), and collateral (fully collateralized or no collateral); a set of control variables (i.e., the region where the firm operates, *DREG*, and the industry to which the borrower pertains, *DIND*); and the characteristics of the bank that grants the loan (*BANKCHAR*), such as its size and type (i.e., commercial or savings bank). We also control for macroeconomic characteristics, including time dummies (φ_t).

We do not consider default immediately after the loan is granted (i.e., in $t + 1$) because it takes time for a bad borrower to reveal as

[14]We consider that a loan is in default when its doubtful part is larger than the 5 percent of its total amount. Thus, we exclude from default small arrears, mainly technical, that are sorted out by borrowers in a few days and that, usually, never reach the following month. The level and the evolution of the probability of default (PD) across time and firm size in Spain can be seen in Saurina and Trucharte (2004). On average, large firms (i.e., those with annual sales above €50 million) have a PD between four and five times lower than that of small and medium-sized enterprises (i.e., firms with annual turnover below €50 million).

such. When granted a loan, a borrower takes the money from the bank and invests it into the project. As the project develops, the borrower is either able to repay the loan and the due interest payments or is not able to pay and defaults. Therefore, it takes time for the default to occur.

Once we have controlled for loan, bank, and time characteristics, we add the relative loan growth rate of bank i at time t with respect to financial loans granted to nonfinancial firms ($LOANG_{it} - averageLOANG_i$)—that is, the current lending position of each bank in comparison to its average loan growth. If α is positive and significant, we interpret this as a signal of more credit risk in boom periods when, probably, credit standards are low. On the contrary, when credit growth slows, banks become much more careful in scrutinizing loan applications; as a result, next-year defaults decrease significantly. To our knowledge, this is the first time that such a direct test has been run. Additionally, we test for asymmetries in that relationship, as in the previous section. We have considered only those banks with a loan growth rate within the 5th and 95th percentile, to eliminate outliers.

It is very important to control for the great heterogeneity due to firm effects, even more because our database does not contain firm-related variables (i.e., balance sheet and profit and loss variables). For this reason, we have controlled for firm (loan) characteristics using a random effects model, which allows us to take into account the unobserved heterogeneity (without limiting the sample as the conditional model does) assuming a zero correlation between the firm effects and the rest of the characteristics of the firm.[15]

Table 3 shows the estimation results for the pool of all loans granted. We observe that the faster the growth rate of the bank, the higher the likelihood to default in the following years. We observe that α is positive and significant when we consider defaults three and four years later, and α is positive, although not significant, for defaults two years after the loan was granted (table 3, columns 1, 3, and 5). As mentioned before, although not reported in table 3, we control for macroeconomic characteristics, region and industry

[15]We have also estimated a logit model with fixed effects, and the results are quite similar.

Table 3. GMM Estimation Results of Equation (2) Using a Random Effect Logit Model (Results for Pool of All Loans Granted)

	(1)		(2)	
Variables	**Coeff.**	**SE**	**Coeff.**	**SE**
Dependent Variable	$DEFAULT_{ijt+2}$ (0/1)		$DEFAULT_{ijt+2}$ (0/1)	
Bank Characteristics				
$LOANG_{it} - AVERAGE$ $LOANG_i$ (α)	0.001	0.001	−0.001	0.001*
$\|LOANG_{it} - AVERAGE$ $LOANG_i$ (β)	—	—	0.005	0.001***
Province Dummies	Yes		Yes	
Industry Dummies	Yes		Yes	
No. Observations	1,823,656		1,823,656	
Time Period	1985–2004		1985–2004	
Wald Test [$\chi(2)$]/p-value	8,959	0.00	9,121	0.00
Test Asymmetric Impact (p-value)				
$\alpha + \beta = 0$	—		0.00	
$\alpha - \beta = 0$	—		0.00	

	(3)		(4)	
Variables	**Coeff.**	**SE**	**Coeff.**	**SE**
Dependent Variable	$DEFAULT_{ijt+3}$ (0/1)		$DEFAULT_{ijt+3}$ (0/1)	
Bank Characteristics				
$LOANG_{it} - AVERAGE$ $LOANG_i$ (α)	0.002	0.001***	0.001	0.001
$\|LOANG_{it} - AVERAGE$ $LOANG_i\|$ (β)	—	—	0.001	0.001
Province Dummies	Yes		Yes	
Industry Dummies	Yes		Yes	
No. Observations	1,643,708		1,643,708	
Time Period	1985–2004		1985–2004	
Wald Test [$\chi(2)$]/p-value	4,800	0.00	4,874	0.00
Test Asymmetric Impact (p-value)				
$\alpha + \beta = 0$	—		0.00	
$\alpha - \beta = 0$	—		0.93	

(*continued*)

Table 3 (continued). GMM Estimation Results of Equation (2) Using a Random Effect Logit Model (Results for Pool of All Loans Granted)

	(5)		(6)	
Variables	**Coeff.**	**SE**	**Coeff.**	**SE**
Dependent Variable	$DEFAULT_{ijt+4}$ (0/1)		$DEFAULT_{ijt+4}$ (0/1)	
Bank Characteristics				
$LOANG_{it} - AVERAGE$ $LOANG_i$ (α)	0.002	0.001**	0.002	0.002
$\|LOANG_{it} - AVERAGE$ $LOANG_i\|$ (β)	—	—	0.000	0.002
Province Dummies	Yes		Yes	
Industry Dummies	Yes		Yes	
No. Observations	1,433,074		1,433,074	
Time Period	1985–2004		1985–2004	
Wald Test [$\chi(2)$]/p-value	2,992	0.00	3,054	
Test Asymmetric Impact (p-value)				
$\alpha + \beta = 0$	—		0.04	
$\alpha - \beta = 0$	—		0.55	

Note: *DEFAULT* is a dummy variable that takes 1 if the loan is doubtful and 0 otherwise. $LOANG_{it}$ is the growth rate of all financial credits granted to firms for bank i. We also control for bank size and type (i.e., commercial or savings) and for loan characteristics (i.e., size, maturity, and collateral). Region, industry, and time dummies have been included. *, **, and *** are significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

of the borrowing firm, size and type of the bank lender, and, finally, for size, maturity, and collateral of the loan granted.

We have also investigated if there is an asymmetric impact of loan growth over defaults (columns 2, 4, and 6 in table 3). In good times, when loan growth of each bank is above its average, we find a positive and significant impact on future defaults (two, three, and four years later). However, in bad times, with loan growth below the bank's average, there is no impact on defaults. Thus, this asymmetric effect reinforces the conclusions about too-lax lending policies during booms.

To test the robustness of the former results, table 4 shows the estimation of the model when the loan growth rate of the bank is introduced without any comparison to its average value. The results obtained are exactly the same: there is no effect on the probability of

Table 4. GMM Estimation Results of Equation (2) Using a Random Effect Logit Model (Loan Growth Rate of Bank Introduced without Comparison to Its Average Value)

Variables	**Coeff.**	**SE**	**Coeff.**	**SE**	**Coeff.**	**SE**
Dependent Variable	$DEFAULT_{ijt+2}$ (0/1)		$DEFAULT_{ijt+3}$ (0/1)		$DEFAULT_{ijt+4}$ (0/1)	
Bank Characteristics						
$LOANG_{it}$	0.001	0.001	0.002	0.001***	0.002	0.001***
Province Dummies	Yes		Yes		Yes	
Industry Dummies	Yes		Yes		Yes	
No. Observations	1,823,656		1,643,708		1,433,074	
Time Period	1985–2004		1985–2004		1985–2004	
Wald Test $[\chi(2)]$/p-value	8,966	0.00	4,802	0.00	2,987	0.00

Note: *DEFAULT* is a dummy variable that takes 1 if the loan is doubtful and 0 otherwise. $LOANG_{it}$ is the growth rate of all financial credits granted to firms for bank i. We also control for bank size and type (i.e., commercial or savings) and for loan characteristics (i.e., size, maturity, and collateral). Region, industry, and time dummies have been included. *, ** and *** are significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

default in $t+2$ and a positive and significant one on the likelihood of default in $t+3$ and $t+4$.

In terms of the economic impact, the semi-elasticity of the credit growth is 0.13 percent for default in $t+3$ (0.13 percent in $t+4$),[16] which means that if a bank grows 1 percentage point, then the likelihood of default in $t+3$ is increased by 0.13 percent (0.13 percent in $t+4$). If a bank was expanding its loan portfolio at one standard deviation above the average rate of growth, the impact would be 1.9 percent (1.9 percent). Thus, the economic impact estimated is low for the period analyzed and the sample considered, despite the significance of the variables.

All in all, the previous results show that in good times, when credit is growing rapidly, credit risk in bank loan portfolios is also increasing.

2.3 Collateral and Credit Growth

This section provides evidence of the behavior of banks in terms of their credit policies along the business cycle. The argument so far has been that too-rapid credit growth comes with lower credit standards and, later on, manifests in a higher number of problem loans. Here, we provide some complementary evidence based on the tight relationship between credit cycles and business cycles. We argue that banks adjust their credit policies depending on the business-cycle position. For instance, in good times, banks relax credit standards and are prepared to be more lenient in collateral requirements. On the other hand, when a recession arrives, banks toughen credit conditions and, in particular, collateral requirements.

If the hypothesis presented in the former paragraph is true, we would have complementary evidence to support prudential regulatory policies. If it is true that, during boom times, loan portfolios are increasingly loaded with higher expected defaults, then it should also be true that other protective devises for banks, such as collateral, are eroded.[17] The following equation allows us to test the relationship between collateral and economic cycle.

[16]The marginal effect of the k-variable is computed as $ME_k = \frac{d[\Pr ob(y=1|\bar{x})]}{dx_k} = \Lambda(\hat{\beta}\bar{x})[1-\Lambda(\hat{\beta}\bar{x})]\hat{\beta}_k$. Then, the semi-elasticity is given by $ME_k/Average\ Default$.

[17]It might also be the case that, during good times, banks decrease credit risk spreads in their granted loans partially as a result of overoptimism and tight

$$\Pr(Collateral_{ijklt} = 1) = F(\theta + \alpha GDPG_{t-1} + \beta|GDPG_{t-1} - Average\ GDP| + Control\ Variables_{ijklt}) \quad (3)$$

A full description of model 3 and its control variables is in Jiménez, Salas, and Saurina (forthcoming). Here we only focus on the impact of GDP growth on collateral, controlling for the other determinants of collateral. The variable on the left-hand side takes the value of 1 if the loan is collateralized and 0 otherwise. j refers to the loan, i refers to the bank, k refers to the market, l refers to the firm (borrower), and t refers to the time period (year). We estimate equation (3) using a probit model. As control variables, we use borrower characteristics (i.e., if they were in default the year before or the year after the loan was granted, their indebtedness level, and their age as a borrower), bank characteristics (size, type of bank, and its specialization in lending to firms), characteristics of the borrower-lender relationship (duration and scope), and other control variables (such as the level of competition in the loan market, the size of the loan, and the industry and region of the borrower).[18]

The database used is the CCR. We focus on all new financial loans above €6,000 with a maturity of one year or more, granted by any Spanish commercial or savings bank to nonfinancial firms every year during the time period between December 1984 and December 2002. We exclude commercial loans, leasing, factoring operations, and off-balance-sheet commitments for homogeneity reasons.

The first column in table 5 shows the results of estimating model 3 for the pool of loans, nearly two million loans. There is a negative and significant relationship between GDP growth rates and collateral; that is, in good times banks lower collateral requirements, and they increase them in bad times. In terms of the impact, the semi-elasticity of *GDPG* is −3.1 percent, which means that an

competition among banks. The opposite would happen in bad times, when bank managers would tighten credit spreads. Unfortunately, our database does not allow us to test this hypothesis.

[18] Jiménez, Salas, and Saurina (forthcoming) contains a similar analysis on a different sample of loans and using a different estimation procedure (i.e., fixed effects).

Table 5. GMM Results of Equation (3) Using a Probit Model

Variables	All Borrowers			
	(1) All Terms		**(2) All Terms**	
	Coeff.	**SE**	**Coeff.**	**SE**
Dependent Variable				
$COLLATERAL_t$ (1/0)				
Macroeconomic Characteristics				
$GDPG_{t-1}$ (α)	−0.045	0.001***	−0.047	0.001***
$\lvert GDPG_{t-1} - Average\ GDPG_{t-1}\rvert$ (β)	—	—	−0.011	0.002***
Regional Dummies	Yes		Yes	
Industry Dummies	Yes		Yes	
No. Observations	1,972,336		1,972,336	
Time Period	1985–2002		1985–2002	
χ^2 Covariates/p-value	279,056	0.00	279,007	0.00
Test Asymmetric Impact (p-value)				
$\alpha + \beta = 0$	—		0.00	
$\alpha - \beta = 0$	—		0.00	

(*continued*)

Table 5 (continued). GMM Estimation Results of Equation (3) Using a Probit Model

	Old Borrowers				New Borrowers			
	(3) Long Term		(4) Short Term		(5) Long Term		(6) Short Term	
Variables	**Coeff.**	**SE**	**Coeff.**	**SE**	**Coeff.**	**SE**	**Coeff.**	**SE**
Dependent Variable								
$COLLATERAL_t$ (1/0)								
Macroeconomic Characteristics								
$GDPG_{t-1}$ (α)	−0.067	0.001***	−0.021	0.002***	−0.054	0.002***	−0.019	0.004***
$\lvert GDPG_{t-1} - Average\ GDPG_{t-1} \rvert$ (β)	−0.004	0.002**	−0.026	0.004***	0.002	0.004	−0.027	0.007***
Regional Dummies	Yes		Yes		Yes		Yes	
Industry Dummies	Yes		Yes		Yes		Yes	
No. Observations	823,340		723,924		254,755		170,317	
Time Period	1985–2002		1985–2002		1985–2002		1985–2002	
χ^2 Covariates/p-value	147,630	0.00	39,368	0.00	41,708	0.00	13,668	0.00
Test Asymmetric Impact (p-value)								
$\alpha + \beta = 0$	0.00		0.00		0.00		0.00	
$\alpha - \beta = 0$	0.00		0.14		0.00		0.26	

Note: *COLLATERAL* is a dummy variable that takes 1 if the loan granted to a firm is collateralized and 0 otherwise. *GDPG* is the real growth rate of gross domestic product. We also control for bank size, type (i.e., commercial, savings, or cooperative), and lending specialization; for borrower characteristics (i.e., if they were in default the year before or the year after the loan was granted, their indebtedness level, and their age as a borrower); for characteristics of the borrower-lender relationship (duration and scope); and for the level of competition in the loan market, the size of the loan, and the industry and region of the borrower. ** and *** are significant at the 5 percent and 1 percent levels, respectively.

increase of 1 percentage point in *GDPG* reduces the likelihood of collateral by 3.1 percent. In the bond market, Altman, Resti, and Sironi (2002) find evidence of a positive and significant correlation between the probability of default (PD) and the loss given default (LGD). Focusing on the loan market, our results show that the positive correlation between PD and LGD need not hold since—as the recession approaches (and the PD increases)—banks take more collateral on their loans, which might decrease the LGD.[19]

The cyclical behavior of banks regarding collateral is not symmetric. Column 2 in table 5 shows that the likelihood to pledge collateral decreases proportionally more in upturns than it increases in downturns, as the negative and significant value of the parameter of the absolute value of the difference between GDP rate of growth and its average across the period studied points out (i.e., −0.092 in upturns versus −0.058 in downturns). Despite the asymmetry, the negative relationship between loan PD and LGD still might hold. Moreover, from a prudential point of view, there are even more concerns regarding the too-lax credit policies maintained by banks during upturns.

Credit markets are segmented across borrowers and across maturities. Therefore, it might be possible that the former aggregated results do not hold for particular market segments. To carry out this robustness exercise, the database is split into two groups: short term (maturing at one to three years) and long term (maturing at more than three years). A second classification of the loans relates to the experience of the borrower. One group of loans, labeled "old," contains those loans from borrowers about whom, at the time the loan is granted, there is already past information in the database (for instance, if they were in default the previous year). The other group of loans, which we call "new," is from borrowers obtaining a loan for the first time. Table 5 (columns 3–6) shows that, although there are some differences across the maturity of borrowers and across old and new borrowers, the main results hold. For old borrowers, the impact of the business cycle on collateral policy is larger for long-term loans than for short-term ones. We find the same result across new borrowers, but the magnitude of the decline in collateral as the

[19]We thank M. Gordy for pointing out this implication.

economy improves is lower. For short-term loans—both old and new borrowers—collateral requirements decline during upturns but do not increase during downturns, either because the firm has no collateral to pledge or because banks put in place other strategies to recover their short-term loans.

3. A New Prudential Tool

The former section has shown clear evidence of a relationship between rapid credit growth and a deterioration in credit standards that eventually leads to a significant increase in credit losses. Banking regulators, aware of this behavior and concerned about long-term solvency of individual banks as well as the stability of the whole banking system, might wish to implement some devices in order to alleviate the market imperfection.

Borio, Furfine, and Lowe (2001) contains a detailed discussion of procyclicality and banking regulator responses. There has been a lot of discussion about the impact of capital requirements on the cyclical behavior of banks.[20] Here, we want to focus on loan loss provisions since we think that they are the proper instrument to deal with expected losses. Thus, we propose a new prudential provision that addresses the fact that credit risk builds up during credit boom periods. This new provision is in addition to the already existing specific and general provisions. The general provision can be interpreted as a provision for the inherent or latent risk in the portfolio—that is, an average provision across the cycle. The new loan loss provision (or the third component of the total loan loss provision) is based on the credit-cycle position of the bank in such a way that the higher the credit growth of the individual bank, the more it has to provision. On the contrary, the lower the credit growth, the more provisions the bank can liberate from the previously built reserve. Analytically, we can write

$$LLP_{total} = \mathit{specif.} + g\Delta C + \alpha(\Delta C - \gamma C_{t-1}), \tag{4}$$

[20]The issue of procyclicality of capital requirements has drawn a lot of attention (Daníelsson et al. 2001, Kashyap and Stein 2004, and Gordy and Howells 2004, to name a few).

where the total loan loss provision (LLP_{total}) has three components: (i) the specific provision (*specif.*), (ii) the latent provision (applied on each new loan granted to cover the average credit risk, g), and (iii) the countercyclical, or forward-looking, provision, where C_{t-1} is the stock of loans for the previous period, γ is the average loan growth rate across banks and across a lending cycle, and ΔC is the absolute growth in total loans. Thus, when the loan portfolio grows above the average historical growth rate, the provision is positive, and it is negative otherwise.

Note that the provision is positive in boom periods and negative during recessions. The more distant the bank behavior is from the total system, the larger the provisioning impact. The underlying idea is quite simple: the more rapid the credit growth, the higher the increase in market share and, presumably, following our empirical results, the higher the credit risk assumed by the bank and, therefore, the higher the provision. The asymmetry found in some of the results of the former section (see table 2) points toward an increase in loan loss provisions in good times, when credit risk increases and there is rapid credit growth, and allowing the previously built loan loss reserves to be depleted in downturns, when the former rapid credit growth materializes as loan losses.

Our proposal is a very simple and intuitive prudential tool to cope with credit risk linked to cyclical lending policies. The provision is not expected to replace the existing provisions but rather to reinforce them. Therefore, we would have specific provisions for impaired assets already individually identified, plus provisions to cover inherent losses in homogeneous groups of loans (i.e., losses incurred but not yet identified in individual loans), as well as provisions that take into account the position of the bank in the credit cycle and, thus, its credit risk profile.

The third component of LLP_{total}, the countercyclical one, has been considered in our proposal as an additional loan loss provision. Alternatively, it could be included in capital requirements (for instance, asked through pillar 2 of the Basel II framework).[21] Banking supervisors, according to their experiences regarding lending cycles and credit risk, might ask banks to hold higher capital levels

[21] See Basel Committee on Banking Supervision (2004).

during booms in order to take into account future problem loan developments. Note that this proposal might contribute to alleviate potential concerns, if any, about increased capital procyclicality within the Basel II framework.

3.1 Simulations

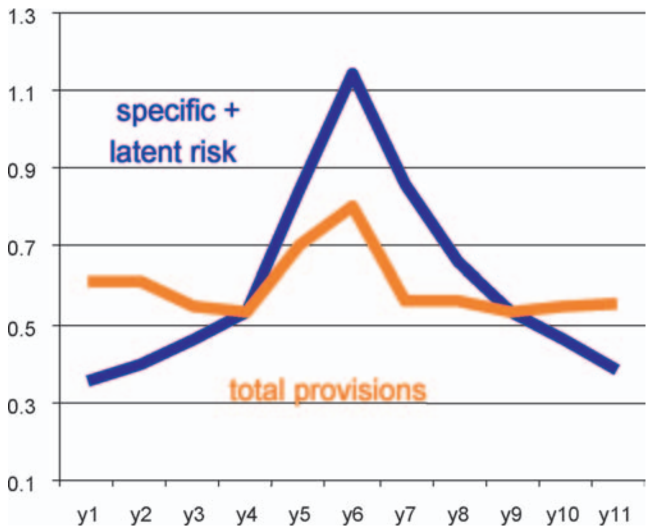
One way to understand the workings of the provision put forward is through a simulation exercise. We simulate a full economic and lending cycle in eleven years. During the first two years, the economy is expanding at full steam, which means rapid credit growth and very low specific loan loss provisions (as a result of low problem loan ratios). From year 3 onward credit growth decreases and problem loans increase with a subsequent increase in specific provisioning requirements. In year 6 the trough is reached with a maximum in provisioning requirements and a minimum in lending growth. From year 7 onward the credit and the economy recover and specific provisions decline. Figure 1 shows the evolution of loan loss provisions over total loans during the eleven years. The evolution of the specific provision plus the general (latent risk) provision (i.e., the first two parts of our provisioning formula (4)) is quite cyclical, with a significant rise around the trough period.

Regarding the third component of the total loan loss provision, when loan growth rates are above the average loan growth rate (i.e., the first three years in our simulation), its amount is positive, charged in the profit and loss account (P&L), and accrued in a provision fund or reserve account. When loan growth starts to dip below the average (between years 4 and 9), the amount is negative and is accrued in the P&L from the previously built fund.[22] From year 10 onward the provision resumes a positive value (as a result of a new expansionary credit cycle), and the fund is being built up again.

What is the final impact of the new provision over a framework that already has a specific and a general provision? The total loan loss provision is smoother than the sum of the specific and

[22] Of course, it is understood that the fund cannot be negative; that is, the bank is not allowed to write as income in the P&L something that has not been previously built up.

Figure 1. Simulation Exercise: Loan Loss Provisions as a Percentage of Total Loans



general provisions (figure 1). But the smoothing is far from total. There is still quite a significant variation of total loan loss provisions across the credit cycle. Of course, during recessions provisions reach the maximum amount, as the specific one dominates the landscape. However, in true boom periods (i.e., years 1 and 2) when loan growth is extremely high, provisioning requirements through the third component of the provision are significant. The new provision is countercyclical, but it does not have a significant impact on total loan loss provisions unless the variability in credit growth rates is extreme, which—for most of the banks—is not the case. At the same time, the volatility of profits is somewhat lower through the cycle.

4. Policy Discussion

The empirical results of the former section provide a rationale for countercyclical loan loss provisions, apart from those covering impaired assets or the latent risk in the loan portfolio. However, accounting frameworks do not fully recognize such a coverage. For instance, although from a prudential point of view there is a rationale for setting aside provisions since the loan is granted, accountants are reluctant to allow it.[23]

Since January 2005, all European Union firms (either banks or nonfinancial firms) with quoted securities in any EU organized market have to comply with International Financial Reporting Standards (IFRS, formerly called International Accounting Standards, or IAS). That means a change in the provisioning system based on specific and general provisions. From 2005 onward, banks have to set aside provisions to cover individually identified impaired assets; for homogeneous loan portfolios, they will be required to cover losses incurred but not yet identified in individual loans. IAS 39 does not allow banks to set aside provisions for future losses when a loan is granted. Therefore, the new standards do not perfectly match the prudential concerns of banking regulators. Borio and Tsatsaronis (2004) show a way to sort out this problem through a decoupling of objectives (i.e., one is to provide unbiased information; the other is to instill a degree of prudence). We believe a more fundamental question is, what purpose should the accounting framework serve and, more importantly, at what price? Financial stability concerns and, therefore, prudent accounting should probably be higher on the list of priorities, especially since there is overwhelming evidence of earnings management. The incentives to alter the accounting numbers will not disappear with IAS.[24] If investors might not, in any case, get the unbiased figures, there might be room for instilling prudent behavior through the accounting rules.

Alternatively, if accounting principles are written in a way that does not allow for sheltering prudential concerns, banking regulators might try other devices in order to counterbalance the negative impact of excessive decreases in credit standards during boom periods. For instance, pillar 2 of the new capital framework put forward by supervisors in Basel II might include a stress test of capital requirements that might be based along the lines developed here for

[23] That is not the case with insurance companies, where the technical provision to cover the risk incurred appears just after the insurance policy has been sold to the customer.

[24] For a theoretical rationale of income smoothing, see (among others) Fudenberg and Tirole (1995) and Goel and Thakor (2003).

the new provision. In a sense, if the accounting framework does not provide enough flexibility to banking supervisors, they should find it through the allowed supervisory discretion of pillar 2.

Either as an additional provision or as a capital requirement, the third component of total loan loss provisions will help to counter the cyclical behavior of own funds in Basel II. Basel I was not properly tracking banks' risks. Basel II is meant to tie capital requirements more closely to risk. Capital requirements will increase during recessions as the probability of default increases. However, the evidence provided in this paper argues that (ex ante) credit risk increases during boom periods. Therefore, without interfering with Basel II pillar 1 capital requirements, pillar 2 adjustment might help to take into account those increases in ex ante credit risk and, somehow, soften the procyclicality of capital requirements.[25]

Rajan (1994) discusses possible regulatory interventions that would reduce the expansionary bias in lending policies—among them, decreasing the amount of loanable funds or imposing credit controls. However, both proposals do not seem very feasible since they might have other negative, unintended consequences, as the author recognizes. Alternatively, close monitoring of bank portfolios by supervisors, and the corresponding penalties, might be the answer. However, that will increase the cost of supervision substantially. Our loan loss provision proposal is inexpensively monitored and easily available for bank supervisors. Moreover, it is not designed to curtail credit growth but to account for the negative impact of too-lax lending policies. It is up to each bank manager to decide its lending policy, but if the lending policy is reckless, loan loss provisions should be proportionally higher to account for future higher credit losses.

This paper also has some implications in terms of financial information disclosure and transparency. It is argued that more disclosure of information by banks will help investors to discipline bank managers and, therefore, to help banking supervisors as well. In fact, that is the main rationale for pillar 3 of Basel II. However, some recent research (Morris and Shin 2002) points toward a more-nuanced position regarding the welfare achievements of more transparency and

[25]The loan loss provision we propose here might work as the "second instrument" proposed by Goodhart (2005) to maintain financial stability.

disclosure and the above-mentioned widespread existence of earnings management. In fact, Rajan (1994) finds what he calls a counterintuitive comparative statics: “Allowing banks to fudge their accounting numbers and to maintain secret (sic) reserves can improve the quality of their lending decisions.”

The new provision is fully transparent. Investors and, more generally, any bank stakeholder could “undo” its effects since they only need to look at the lending growth rate of the bank and the average of the system. Of course, transparency could improve even more if regulators make it compulsory to release the amount of the stress provision in the annual report of each bank. Here, we are not trying to manage earnings or, more precisely, to smooth banks’ income through that provision. Instead, we are just trying to cope with latent risks in bank loan portfolios in a way that is fully transparent and not properly addressed by IAS or even Basel II capital requirements. In fact, it might be possible that our proposal could contribute to a decline in income-smoothing practices across banks since (at least partially) some of their causes would be covered by the new provision. Thus, contrary to Rajan, banking regulators would have no need to allow banks more discretion to “fudge” their accounts since the regulatory framework would allow for an appropriate coverage of latent risks in good times and a lower impact on the P&L in bad periods that would result in a less volatile pattern for profits through the cycle.

Banco de España has applied the so-called statistical provision from mid-July 2000 onward. It is a countercyclical provision. When the three currently existing loan loss provisions (i.e., specific, general, and statistical) are added up through an economic cycle, the quotient between total loan loss provisions and total loans remains almost constant along time. Accountants did not ever like this total smoothing effect along the credit cycle. The new provision that we have developed in this paper does not have those drawbacks. First of all, the quotient between total loan loss provisions and total loans shows a cyclical pattern (i.e., increases in bad times), but that pattern is much less pronounced than before (figure 1). From a prudential point of view, it is very important that total loan loss provisions are relatively high in the peak of the lending boom. Secondly, although total loan loss provisions are high in boom periods, the maximum is reached around the recession, when impaired assets are also at their maximum. Thus, loan loss provisions are not completely smooth along the business cycle.

5. Conclusions

Increasing banking competition—coupled with agency problems, strong balance sheets, and some other characteristics of banking markets (such as risk-related capital requirements, imperfections in the equity market, and maturity mismatches)—may bring about lower credit standards that translate into too-expansionary credit policies and, eventually, higher loan losses. Therefore, a bank regulator concerned about the negative effects of too-rapid credit growth on individual banks' solvency and on the whole stability of the banking system might use some prudential tools in order to curtail excessive lending during boom periods and, by the same token (although in the opposite direction), too-conservative credit policies during recessions.

The empirical literature on the relationship between excessive loan growth and credit risk is scant. The first contribution of this paper is to provide more precise and robust evidence of a positive, although quite lagged, relationship between rapid credit growth and future nonperforming loans of banks. Moreover, we also find a direct relation between the phase of the lending cycle and the quality and standards of the loans granted. During lending booms, riskier borrowers obtain funds, and collateral requirements are significantly decreased. Lower credit standards and a substantial lag between decisions made on loan portfolios and the final appearance of loan losses point toward credit risk significantly increasing during good times. Therefore, credit risk increases in boom periods, although it only pops up as loan losses during bad times.

The second contribution of this paper is to develop a loan loss provision (i.e., a prudential tool) that takes into account the former developments. The idea is that banks should provision during good times for the increasing risk that is entering their portfolios and that will only reveal as such with a lag. On the other hand, in bad times banks could use the reserves accumulated during boom periods in order to cover the loan losses that appear but that entered the portfolio in the past. Thus, we develop a countercyclical provision that is a direct answer to the robust empirical finding of credit risk increasing in good times.

Accounting frameworks usually do not allow for countercyclical provisioning—that is, for the coverage today of latent credit risk in banks' portfolios. Therefore, given the interest of supervisors in a prudent coverage of risks, it might be possible to transform the former countercyclical provision into a capital requirement based on a stress test included in pillar 2 of Basel II, the new regulatory capital framework for banks. In doing that, those that have shown concerns about increased procyclicality of Basel II might find some help.

All in all, the paper combines theoretical arguments with robust empirical findings to provide the rationale for a countercyclical loan loss provision. The paper is a contribution to the intense debate among supervisors and academics on the proper tools to enhance financial stability.

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