COUNTER-CYCLICAL PROVISIONS, MANAGERIAL DISCRETION AND LOAN GROWTH: THE CASE OF SPAIN

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Abstract:

Reducing credit procyclicality represents one of the key challenges on the regulatory agenda to reform the financial system architecture following the banking crisis initiated in 2007. The Spanish counter-cyclical provisions scheme implemented in 2000 has been one of the main reference points in this context. The objective of the present paper is to analyze the effects of counter-cyclical provisions upon managerial discretion in loan-loss provisioning and upon loan growth. We empirically examine a sample of Spanish banks using quarterly information from 2000Q1 to 2010Q1. The results suggest that the counter-cyclical provisioning scheme has been effective in reducing the procyclicality of loan-loss provisions over time and restricting capital management. It also appears to have been effective in reducing the impact of discretional income smoothing over time. However, it did not prevent excessive lending growth in the pre-crisis period. Our findings also show that income smoothing, profit signaling and the procyclicality of loan-loss provisioning are significantly larger in banks showing higher loan growth rates before the crisis and, in particular, in those which eventually received government funding under the restructuring scheme implemented in Spain during the crisis.

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Key words: loan-loss provisions, discretionary bank management, financial crisis.

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I. INTRODUCTION

Reducing procyclicality is one of the key questions under discussion in the reform of financial regulation following the recent banking crisis. In a broad sense, procyclicality is the phenomenon of amplifying feedbacks within the financial system and between the financial system and the macroeconomy. In this regard, there is an ongoing debate on the need to introduce countercyclical capital rules in banking. A second area of concern is how to mitigate the procyclical effects of the current loan-loss provisions scheme. The focus of the present paper is on this latter issue.[1]

An important dimension in the management of loan-loss provisions is the extent to which they are subject to discretion. In most countries, including the USA, loan-loss provisions are left to managers' judgment, while in the few remaining countries, such as Spain, the loan-loss provisions are specified in rules. Leaving provisioning to the decisions of managers may introduce discretion into the sum of loan-loss provisions accruing in the income statement. The alternative of introducing rules does not necessarily eliminate all sources of managerial discretion. In order to be fully effective, rules must cover loan losses and limit the ability of managers to use provisions for discretionary purposes, such as to smooth income or "artificially" alter their capital ratios. The growth in bank loans is also related to this discretionary behavior. In particular, banks usually loosen credit standards in an upturn, due to the low level of contemporaneous non-performing loans. The longer the upswing, the more likely it is that managers will play down the "lessons" of the latest downturn and enter into excessive loan growth (institutional memory herd behavior).

[1] Both the Basel Committee of Banking Supervisors (BCBS) and the International Accounting Standards Board (IASB) are working on proposals to help improve banks' provisioning schemes and set aside provisions against expected losses (IASB, 2009; BIS, 2010).

Another key aspect of loan-loss provisioning schemes is the extent to which provisions cover not only realized losses but also expected losses. In many countries, such schemes (whether based on rules or discretion) are backward-looking and, therefore, the credit losses arising from economic downturns are more likely to require banks to recognize more loan losses during recessions, thereby encouraging greater procyclicality. Spain is an exception in this respect, since its supervisory authorities implemented the so-called "counter-cyclical provisions" back in 2000, as a macroprudential tool to enhance bank soundness and to help mitigate part of the procyclicality of loan-loss provisioning[2]. These counter-cyclical (also called statistical, general or dynamic) provisions are computed as the difference between expected credit losses and specific provisions. The basic idea is to raise bank provisions significantly in good times, while allowing them to fall in bad times, thereby smoothing risk over the business cycle.

In this paper we examine the degree to which counter-cyclical provisions have achieved some of their key objectives in reducing procyclicality in loan-loss provisioning and lending. Specifically, we analyze the effects of counter-cyclical provisions in managerial discretion in loan-loss provisioning and loan growth, employing the Spanish case as a natural laboratory. Previous papers have explored particular aspects of earnings and capital management under a countercyclical provisioning regime in the pre-crisis period. Our paper extends this approach by analyzing the effects of loan growth on managerial discretion and, ultimately, on the

[2] Other countries also have various counter-cyclical prudential instruments in use, although they are not directly related to the provisioning scheme. Some well-known examples are the caps on loan-to-value ratios for property lending (Hong Kong SAR, Korea, Malaysia or Singapore), the caps on ratios of debt service to income for household lending (Hong Kong SAR, Korea), or caps on loan-to-deposit ratio, core funding ratios, reserve and other liquidity requirements (Argentina, China, Hong Kong SAR, Korea and New Zealand). See BIS (2010) for a detailed description of these prudential policy tools.

effectiveness of counter-cyclical provisions before and during the crisis.[3] By way of preview, our results show that the Spanish counter-cyclical provisioning scheme has been reasonably effective in restricting capital management and reducing the procyclicality of loan-loss provisions. It has also contributed to reducing discretionary income smoothing over time. However, it has not prevented excessive lending growth. Importantly, income smoothing, profit signaling and the procyclicality of loan-loss provisioning are significantly larger in banks showing the higher loan growth rates before the crisis and in those which eventually received government funding under the restructuring scheme implemented in Spain during the crisis.

The structure of the paper is as follows. Section II discusses the role of managerial discretion in loan-loss provisioning and how a lack of institutional memory may lead to excessive lending growth. Section III describes Spanish counter-cyclical provisions and the principal changes in the most relevant magnitudes in our analysis. Section IV defines the empirical strategy, hypotheses, data and empirical methodology. The results are presented in Section V. A summary of the main results and conclusions in Section VI ends the paper.

II. LOAN-LOSS PROVISIONS, MANAGERIAL DISCRETION AND THE INSTITUTIONAL MEMORY HYPOTHESIS

II.a. Managerial discretion in loan-loss provisioning

From a theoretical standpoint, a primary objective of loan-loss provisioning is to cover all loan losses, including both realized and latent or expected losses. However, many provisioning schemes and accounting practices are based on rules which exclude

[3] As the BIS (2010) notes, "Spanish dynamic provisions may have contributed towards increasing the resilience of the Spanish banking sector, forcing banks to build up buffers against particular types of lending… but dynamic provisioning has done little to smooth the supply of credit".

losses that are expected but not yet recorded. In particular, there are various sources of discretionary behavior in loan-loss provisioning, principally earnings management and capital management, which are potentially able to alter the primary objective of covering losses.

Earnings management: income smoothing and profit signaling

One of the main manifestations of earnings management is income smoothing, which is aimed at reducing the variability of net profits over time. During upswings, managers use some accounting items (mainly provisions) to decrease net operating income. In downturns, the same accounting items are used conversely to increase profits (Kim and Santomero, 1993). In principle, smoothing income may have a positive impact upon reducing the cyclicality of lending. In one sense, income smoothing is considered "desirable", because it reduces the perceived volatility of income, thereby maintaining stock price stability. However, income smoothing may discourage bank managers from accurately disclosing loan losses, resulting in misleading information concerning the bank's condition. To the extent that the variability of net income is a measure of risk, income smoothing may reduce the perceived riskiness of the bank, yet the "true" risk could be higher than the perceived risk. With regard to empirical research into income smoothing, some studies have found evidence of income smoothing in the US banking sector (Greenawalt and Sinkey, 1988; Wahlen, 1994) while others have found no evidence of this type of earnings management (Beatty *et al.*, 1995; Ahmed *et al.*, 1999). Bikker and Metzemakers (2005) analyze earnings behavior in 29 OECD countries using 8,000 bank-year observations. They find statistical evidence of income smoothing in countries such as the USA, France or Italy, but none in Japan, the UK or Spain. However, Pérez *et al.* (2006) encounter evidence of income smoothing in

Spanish banking, although they observe a decline in its intensity following the establishment of the counter-cyclical provisions.

Together with income smoothing, earnings management can be used as a signaling mechanism[4]. Bank managers may use loan-loss provisions to manage earnings and 'signal' private information about future prospects. If managers have information indicating that the book value of the bank is higher than the market value, such banks may use provisions as a signal of strength (the potential to absorb future losses), thereby increasing their market value. The empirical evidence on the existence of signaling behavior is mixed. In the USA, Wahlen (1994) and Beaver and Engel (1996) have found evidence of such behavior, contradicting Ahmed *et al.* (1999). Bouvatier and Lepetit (2006) have also demonstrated the use of loan-loss provisions for profit signaling in France, Germany, Italy and the United Kingdom. As for the Spanish case, Anandarajan *et al.* (2003) have found no evidence of signaling.

Capital management

In capital management behavior, banks use loan-loss provisions to alter their regulatory capital ratios. From among the reasons for managing the capital ratio through provisions, some previous studies have highlighted the significant costs of raising new capital on the market or the trade-off between reserves and dividend payments (Kim and Kross, 1998; Ahmed *et al.*, 1999; Cortavarria *et al.*, 2000; Das and Ghosh, 2007). Capital management may then have undesirable effects for bank risk management since it implies an "artificial" increase in capital ratios at the expense of a reduction in the coverage of expected losses. By exerting capital management, banks decide the current loan-loss provision of the period, and enable retained earnings to contribute to reducing

[4] Earnings management may also occur due to moral hazard and agency problems beyond the scope of this paper, such as perceived bankruptcy concerns or attempts by managers to move share prices upwards when they trade for liquidity reasons and shareholders perceive a potential decline in the bank's value (see, for example, Fudemberg and Tirole, 1995 or Goel and Thakor, 2003).

the distance between the target and the level of regulatory capital. In the Spanish case, once the dividend policy is fixed, banks can only change regulatory capital ratios through retained earnings, because general provisions are not considered to be regulatory capital.[5] Under this regime, if banks use loan-loss provisions to manage capital, current total loan-loss provisions will be positively correlated with capital at the beginning of the period. If banks observe that their regulatory capital at the beginning of the period is low (high), they may then decide to reduce (increase) provisions to increase (reduce) net profits and retained earnings.

Turning to the empirical evidence on capital management behavior, Moyer (1990) and Scholes *et al.* (1990) have shown that US banks use loan-loss-provisions to manage capital ratios when regulatory capital is low. However, Collins *et al.* (1995), Kim and Kross (1998) or Ahmed *et al.* (1999) have found no evidence of such behavior in US banks. The cross-country analysis by Bikker and Metzemakers (2005) suggests that capital management behavior exists in the USA, Japan and most EU countries, although no evidence is found for Spain. Perez *et al.* (2006) also find no evidence of capital management in Spanish banks.

II.b. Institutional memory and excessive lending

The institutional memory hypothesis maintains that the capacity of bank loan officers to evaluate risk and identify potential problem loans declines as time elapses since their last loan bust. As shown by Berger and Udell (2004) this deterioration in managerial ability may result in an easing of credit standards, as officers become less able to recognize potential loan problems and distinguish lower-quality from higher-

[5] In many countries, as in the USA, general provisions are included in regulatory capital. In these regimes, a positive relationship is to be expected between the current loan-loss provisions and the beginning-of-period capital ratios in economic downturns and a negative association between the two in upturns.

quality borrowers. This behavior may exacerbate fluctuations in lending cycles. Concretely, in good times an accumulation of potential risk (expected losses) is built up, while this risk emerges in bad times as a result of previous excessive lending and declining credit quality. The institutional memory hypothesis may be seen as a paradigm of the so-called inherent instability of financial systems (Minsky, 1982), a behavior which has been explained by factors such as disaster myopia– underestimating the likelihood and magnitude of financial crises (Guttentag and Herring, 1984; Herring, 1999)- or herd behavior, when loans officers do what others are doing rather than using the information available to them (Banerjee, 1992; Rajan, 1994; Berger and Udell, 2004).[6]

III. THE SPANISH PROVISIONING SCHEME BEFORE AND DURING THE FINANCIAL CRISIS

III.a. The Spanish provisioning scheme

The cyclical behavior of bank loan-loss provisions has been a trend common to many countries in the last three decades, Spain being no exception. In 2000, the Bank of Spain introduced the so-called counter-cyclical, dynamic or statistical provision aimed at forcing banks to set aside provisions for the expected losses which are embedded in their expanding credit portfolios during good times, allowing them to use the reserve to cover realized losses during bad times. [7] The mechanism of statistical or counter-cyclical provisions is depicted in Figure I. When a Spanish bank grants a loan,

[6] During the current financial crisis, herd behavior in lending may have intensified in certain countries. Some empirical studies have shown that in the last three decades a loosening of bank credit conditions has occurred during upturns due, *inter alia*, to a low level of contemporaneous non-performing loans and the extraordinary (although temporary) opportunities for profit in lending to the real estate and construction sector. Among other consequences, this behavior produced housing bubbles (Borio *et al*. 2001; Berger and Udell, 2002; Gerardi et al., 2008). Herding behavior may cause managers of different banks to ease credit standards simultaneously, and supervisors enforcement may be perceived as lighter when many banks are exerting such herding simultaneously (Rajan 1994; Acharya 2001; Shleifer and Vishny, 2009).

[7] Together with Spain, countries such as Uruguay, Peru or Bolivia have set aside similar dynamic provisioning schemes. See Wezel (2010) for a detailed description.

it must set aside a provision consistent with the historical loss experience of such loans (even if there is no current sign of impairment). By using long-run historical losses, counter-cyclical provisions are intended to counter the natural procyclicality of specific provisions. With counter-cyclical provisions (CP_t), the loan-loss provision system in Spain functions as follows[8]:

$$\Delta CP_t = \sum_{i=1}^{6} \alpha_i \Delta L_{it} + \left(\sum_{i=1}^{6} \beta_i L_{it} - \Delta SP_t \right) \qquad (1)$$

where ΔCP_t is the change in counter-cyclical provisions; α_i is an average estimate of loan losses in year t from a cyclical perspective for loans in risk category i (i=1,…6); ΔCP_t is the change in the stock of loans of risk category i in period t; β is the average specific provision for the six risk categories over a business cycle and SP_t is the specific provision made in period t. The difference between $\sum_{i=1}^{6} \beta_i L_{it}$ and ΔSP_t is indicative of the strength (or weakness) of the lending cycle. During expansionary periods non-performing loans and specific provisions are very low; thus, the difference between $\sum_{i=1}^{6} \beta_i L_{it}$ and ΔSP_t is positive and that amount is charged to the profit and loss account, increasing the counter-cyclical (general) loan-loss provision fund and accumulating provisions. However, during recessions non-performing loans and specific provisions rush to the fore and the difference between $\sum_{i=1}^{6} \beta_i L_{it}$ and ΔSP_t becomes negative. If the amount of loans (L) declines, $\sum_{i=1}^{6} \alpha_i L_{it}$ is also negative. The final negative amount is drawn down from the counter-cyclical/statistical fund, provided it has a positive balance, and written down in the profit and loss account. It should also be noted that

[8] For a detailed description of the accounting framework of the Spanish counter-cyclical provisions, see Saurina (2009).

there is a ceiling on the fund for counter-cyclical loan-loss provisions, fixed at 125% of the product of parameter α and the total volume of credit exposures. The definitions and weights of the risk for different loan categories within this system are given in Table I.[9]

With regard to the evidence on the effectiveness of the Spanish scheme, to date the empirical contributions which deal directly with the Spanish counter-cyclical provisions are limited and generally analyze the pre-crisis environment. In particular, Pérez *et al.* (2006) study the extent to which earnings and capital management affected Spanish banks during 1986-2002. They construct an accounting and empirical model which shows that, following the introduction of the statistical provision, general and specific loan-loss provisions depended more on the "true" credit risk of loans than on net operating income. Thus, counter-cyclical provisions may have contributed to reducing the possibility of earnings management, by curbing the effect of specific loan-loss provisions upon bank profits (Balla and McKenna, 2009) [10].

Anecdotal evidence also suggests that the counter-cyclical system has had a significant impact upon loan-loss provisioning levels in Spain. As Saurina (2009) demonstrates, in 1999 the loan-loss provisions of Spanish banks were the lowest among OECD countries. In 2006, the Spanish banking system had by far the highest coverage ratio among Western European countries, at 255 percent. As shown in Figure II, total

[9] Between 2000 and 2004, the counter-cyclical provisions were implemented in addition to specific and "general" provisions. At that time, general provisions were a fixed provision applied to the total loan portfolio. In 2004, the Bank of Spain revised the counter-cyclical provisioning system in response to the adoption of the International Financial Reporting Standards (IFRS) by the European Union. The changes involved a reversion to only two types of loan-loss provisions: specific and counter-cyclical or statistical provisions (from 2004 onwards, counter-cyclical provisions were also called "general" provisions). Additionally, counter-cyclical provisions were included in Tier 2 capital i.e. up to 1.25 percent of risk-weighted assets.

[10] Some studies have simulated what would have happened if a dynamic provisioning framework (akin to that implemented in Spain) had allowed a build-up of reserves during the boom years in the United States. In particular, Balla and McKenna (2009) and Sacasa (2010) show that such implementation would have smoothed bank income and provisioning levels over the cycle.

provisions in 2005-2009 increased far less than specific provisions, due to the application of counter-cyclical provisions. The flow of provisions (Figure III) also demonstrates this trend, reflecting the macroprudential approach inherent in the Spanish provisioning system. As Roldan (2010) notes, between mid-2007, when lending entered a phase of deceleration, and the end of 2009, the flow of specific provisioning as a percentage of loans grew over tenfold, while the flow of total provisions merely doubled.

III.b. The effects of the financial crisis

Spain is also an interesting case in that the majority of Spanish banks were hit by the international financial crisis later than those in most countries, a circumstance commonly associated with the existence of a loan-loss provisioning scheme acting as a buffer. However, a significant number of financial institutions were eventually severely affected, and during 2009 and 2010 the Spanish government established the rescue/restructuring Fund for the Orderly Restructuring of the Banking Sector (FROB for its Spanish name), with two main objectives: intervention into non-viable institutions and the consolidation and reinforcement of the banking sector through integration processes. Banks which merged or restructured were permitted to apply for funding from the FROB until at least December 2010. We have built a subsample of 31 banks that needed restructuring funds from FROB and/or were seized by the Bank of Spain. All the 31 institutions in this subsample were savings banks. 29 of these banks were involved in several merger processes and applied for aid totaling €10.19 billion

from the FROB. On top of these, the other two banks in the subsample were seized by the Bank of Spain.[11]

IV. HYPOTHESES, DATA AND METHODOLOGY

IV.a. The Spanish case as a laboratory: data and hypotheses

Our principal empirical goal is to evaluate the effectiveness of the Spanish counter-cyclical provisions system by analyzing the extent to which this scheme has in fact reduced procyclicality, restricted managerial discretion and curbed excessive lending growth.

Our sample consists of 55 Spanish banks (45 savings banks and 10 commercial banks), employing quarterly information from 2000Q1 to 2010Q1 (2,255 bank-year observations). This sample represents 91% of total bank assets in Spain. The sample period covers the implementation of the counter-cyclical provisioning scheme and the pre-crisis and crisis environment; it also encompasses both a strong expansion of credit until 2007, and, from then onwards, a sharp deceleration in lending together with a significant rise in non-performing loans.

Following the theoretical predictions regarding managerial discretion and institutional memory behavior, we evaluate the Spanish counter-cyclical scheme employing the following hypotheses:

- ***Hypothesis 1 (procyclicality of loan-loss provisions)***: As a counter-cyclical tool, statistical provisions potentially reduce the impact of the business cycle on total loan-loss provisioning. Therefore, following the implementation of statistical provisions, the

[11] One of these interventions took place before the FROB was implemented and the bank so seized has been allocated €3.78 billion in aid from the Deposit Guarantee Fund, while the second bank seized has received €0.55 billion from the FROB.

expected negative relationship between loan-loss provisions and GDP growth should decrease over time.

- *Hypothesis 2 (managerial discretion):* Counter-cyclical provisions have a ***profit smoothing*** effect by definition. However, this smoothing is subject to rules and, if provisioning is fully effective, it lessens the effect of specific loan-loss provisions upon bank profits. Specifically, loan-loss provisions depend upon the "true" credit risk of loans and not upon net operating income. Therefore, we would expect the significance of any statistical relationship between loan-loss provisions and net operating income to diminish over time. Additionally, since statistical provisions are intended to reflect (incurred and expected) bank losses, we would not expect the use of loan-loss provisions to produce ***profit signaling***. Therefore, we would expect to find no relationship between current loan-loss provisions and end-of-period net operating income. Finally, we would expect to find no evidence of ***capital management*** if the relationship between beginning-of-period regulatory capital ratio and loan-loss provisions is not statistically significant.

- *Hypothesis 3 (excessive loan growth)*: In order for counter-cyclical provisions to be fully effective, they should (for a given desired leverage) provide incentives for banks to grant loans more carefully, due to these mandatory provisions for performing loans. In this case, we would expect lagged loan growth rates (and, in particular, high-order lags reflecting institutional memory) to be unable to explain current loan default rates.

In order to test these hypotheses, we obtained bank-level information for the discretionary and non-discretionary components of loan-loss provisioning, as well as for a set of determinants of non-performing loans. Additionally, to further explore the relationship between excessive lending and earnings and capital management, we divided the sample into four categories: all banks, banks showing high loan growth,

banks showing moderate loan growth and banks receiving government restructuring funds during the crisis. Banks with high loan growth are defined as those whose average loan growth in the pre-crisis environment (2000-2007) corresponded to the highest quartile of the distribution of the loan growth rate variable. Banks with a moderate loan growth rate were classified as those around the median values of the loan growth variables (second and third quartiles). The subsample of 31 banks that received government support are included to determine whether any kind of earnings, capital management or lack of institutional memory behavior are significantly different for such institutions; thus, we associate ex-ante provisioning schemes with ex-post bank restructuring outcomes. As preliminary evidence of differences across these bank groups, Figure IV shows that average loan growth rates are among the highest for the restructured banks, particularly in the years immediately preceding the crisis.

IV.b. Empirical setting

In our empirical setting, loan-loss provisions are explained as a function of discretionary and non-discretionary behavior, together with a set of control variables. In order to test hypotheses 1 and 2 we estimate the following reduced-form equation:

$$LLP_{it} = f(DC_{it}, NDC_{it}, CV) \qquad (2)$$

where LLP_{it} is the ratio of loan-loss provisions to total assets. The vector of discretionary components (DC_{it}) includes the ratio of non-performing loans to total assets (NPL), while the ratio of non-discretionary components (NDC_{it}) includes net operating income (NOI) and the ratio of capital to total assets (CAP). The vector of control variables (CV) includes the loan-to-assets ratio as a proxy for bank specialization (SPE); bank size as the log of total assets (LTA); a measure of income smoothing symmetry (ISS); the general index of the Madrid stock exchange, as a proxy

for expectations regarding economic conditions (EEC); GDP growth (GDPG); and the Lerner index of bank market power (MPW). The definitions and sources of these variables are provided in Table II.

NPL, EEC and GDPG can be interpreted as measures of credit risk. Consistent with discretionary behavior in loan-loss provisions, we would expect LLP to increase in line with NPL. EEC captures expectations regarding economic conditions, which may affect provisioning decisions. A negative sign is expected for GDPG, as loan-loss provisions increase during downturns and decrease in upturns. If the magnitude of this coefficient decreases following the implementation of the counter-cyclical provisions, these measures will therefore contribute to reducing procyclicality, as suggested in hypothesis 1. In equation (2), consistent with hypothesis 2, we would expect profit smoothing behavior if the coefficient of NOI is positive and significant. We will also determine whether evidence exists of profit signaling, by testing whether end-of-period net operating income (NOI_{t+1}) is significantly related with LLP. Similarly, capital management behavior is proven if CAP is positively and significantly related to LLP. As in Perez *et al.* (2006), the income smoothing symmetry variable is included in equation (2) to test whether income smoothing behavior is symmetrical in periods of expansion and contraction and, in particular, before and during the crisis. ISS is defined as the absolute value of the difference between the net operating income of the bank in a given year and its average net operating income over the period. Finally, the Lerner index of market power (MPW) is also included as a control variable, to test whether competitive pressures may have affected the provisioning policies of banks, by broadening or narrowing managerial discretion.

On the question of excessive loan growth behavior (hypothesis 3), we adopt the empirical structure proposed in most previous studies to estimate the following reduced-form equation:

$$NPL_{it} = f\,(LGR_{it\text{-}n},\ CV) \qquad (3)$$

where the ratio of non-performing loans is explained by a vector of lagged loan growth (LGR) terms and a set of control variables. As for the LGR variable we include lags of 1, 2, 4 and 8 quarters. Consistent with institutional memory behavior, if the high-order lags of the NPL variable are statistically significant and the low-order lags are not, there would be evidence of institutional memory problems, suggesting that bank managers relax credit quality as the time from the last downturn increases. In our context, banks displaying relatively high loan growth rates in the year prior to the crisis are those most likely to exhibit this type of herding behavior. The control variables in equation (3) include one lag of NOI, $CAP_{t\text{-}1}$, SPE, LTA, EEC, GDPG and *MPW*. We further include other macroeconomic control variables which may affect the quality of credit standards, such as the growth in real house prices (RHPG) and the 1-year Euribor rate (1YE), together with other bank-level variables which may also affect non-performing loans, such as the efficiency ratio of cost-to-income (EFF), the one-year lagged branch growth rate ($BGR_{t\text{-}4}$) and the return on equity (RoE).

In both equations (2) and (3), the lagged values of the dependent variables might affect, at least partially, the current values of these variables. In this case, a "dynamic" specification with lagged dependent variables is employed, as regressors are able to address these potential feedback effects. For the same reason, we employ a dynamic panel methodology which relies on the Generalized Method of Moments (GMM) estimator formulated by Arellano and Bover (1995) and Blundell and Bond (1998), and refined by Blundell *et al.* (2000). This GMM estimator is called the *system estimator,*

since it combines, in one system, the regression in differences with the regression in levels. The instruments for the equation in differences are the lagged exogenous variables and the lagged values of the potential endogenous variables. The instruments for the equation in levels are the lagged differences of the corresponding variables. These are appropriate instruments under the following additional assumption: although correlation may exist between the levels of the right-hand side variables, there is no correlation between the differences of these variables and the firm-specific effect.

The system estimator is appropriate to estimate the following specification:

$$y_{i,t} = \alpha y_{i,t-1} + \beta' X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (4)$$

where *y* is the dependent variable*, X*, is the vector of regressors in equations (2) and (3), η_i is an unobserved firm-specific effect and ε is the error component. The firm-specific effect is eliminated by taking first-differences in equation (4), so that:

$$y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta'(X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (5)$$

All variables are expressed in logs, and thus the differences can be interpreted as growth rates. Appropriate instruments must be employed to deal with the likely endogeneity of the explanatory variables, and also to take into account that the new error term ($\varepsilon_{i,t}$-$\varepsilon_{i,t-1}$) is correlated with the lagged dependent variable ($y_{i,t-1}$-$y_{i,t-2}$). In order to assess the appropriateness of our instrumental variables we conduct a Durbin-Wu-Hausman (DWH) test. The DWH is an F-test for overidentifying restrictions in each of the regressions (Davidson and McKinnon, 1993, pp. 237-242). These instruments are particularly appropriate when the DWH rejects the null hypothesis that the instruments have no effect on the estimates of the regression coefficients. If the p-value of the DWH test is under 10%, the null hypothesis is rejected and the instrumental variables are accepted.

V. RESULTS

V.a. Main results

Table III presents our main results for the whole sample. In the first two columns of Table III, the coefficient of non-performing loans (NPL) -the discretionary component of loan-loss provisioning (LLP)- is positive and significant, as expected. Similarly, there appears to be evidence of procyclicality in loan-loss provisioning **(hypothesis 1)**, since the coefficient of GDP growth (GDPG) is negative and significant. With regard to managerial discretion **(hypothesis 2)**, the positive and significant coefficient of net operating income (NOI) suggests that banks employ income smoothing. On the question of the impact of end-of-period profits on current loan-loss provisioning, the positive and significant coefficient of NOI_{t+1} in the second column of Table 3 suggests that Spanish banks use provisions to signal positive profit prospects. However, there is no evidence of capital management, since the coefficient of the beginning-of-period capital ratio (CAP) is not found to be statistically significant. It is worth noting that the coefficients of the discretionary components of loan-loss provisioning (NOI and CAP) are significantly lower (0.132 and -0.003) than the coefficient of the discretionary component, NPL (0.193). Concerning the control variables, those banks displaying high loans to assets ratio (ESP) increase loan-loss provisions to a significantly larger extent.[12] Additionally, income smoothing asymmetry appears to exist. In particular, the positive and significant coefficient of ISS suggests that bank income smoothing is greater in periods of relatively high profits, a finding consistent with the evidence found by Pérez *et al.* (2006).

[12] We also included a dummy to test whether the accounting change implemented in 2004 (to make the counter-cyclical provisions comply with the IFRS) had an impact on our results. However, the dummy was not found to be statistically significant (for the sake of simplicity it is not given here).

The third column in Table III tests the institutional memory hypothesis **(hypothesis 3)**. While the first- and fourth-order lagged loan growth variables (LGR_{t-1} and LGR_{t-4}) are not found to significantly affect current non-performing loan levels (NPL), the two-year and three-year lagged loan growth rates (LGR_{t-8} and LGR_{t-12}) are found to have a positive and significant effect on NPL. This suggests that excessive lending eventually produces poorer credit quality, with a time span of at least two years, indicating a lack of institutional memory. Among the macroeconomic determinants of NPL, GDP growth and the one-year lagged growth in real house prices ($RHPG_{t-4}$) are found to be negatively and significantly related to credit quality. As for the bank-level determinants of non-performing loans, the one-year lagged branch growth (BGR_{t-4}) is positively and significantly related to NPL, suggesting adverse selection problems in bank expansion strategies. We also find that greater efficiency (lower EFF) generates improved credit quality. These findings are similar to those obtained by Salas and Saurina (1999) for the Spanish banking sector in the period 1988-1997.

V.b. Intensity of managerial discretion over time

Although the results shown in Table III suggest that counter-cyclical provisions may have been more effective in avoiding capital management than income smoothing and profit signaling, we wonder whether the intensity of earnings management decreases over time, and in particular before and during the financial crisis. Table IV analyzes these trends for the periods 2000Q1-2007Q2 and 2007Q3-2010Q2[13]. The coefficient of NOI (indicating income smoothing) decreases from 0.138 to 0.123 between the two periods. Additionally, while there is evidence of profit signaling in the pre-crisis period, there is no evidence of such behavior during the crisis (the coefficient

[13] A low number of observations prevented us from testing the institutional memory hypothesis for different sub-periods.

of NOI_{t+1} in the second period is not statistically significant). It should also be noted that the procyclicality of loan-loss provisions also appears to decrease over time. In particular, the impact of GDPG upon NPL decreases in absolute terms between the two periods, from -0.184 to -0.036.

V.c. Managerial discretion and loan growth

Table V presents the results regarding the hypothesis of increased managerial discretion (earnings and capital management) in high loan-growth banks and moderate loan-growth banks. The estimated parameter for income smoothing (NOI) is 0.253 for high loan-growth banks and 0.125 for moderate loan-growth banks. Interestingly, evidence of profit signaling is only significant for banks with a high loan growth rate. Figure V displays the evolution of the estimated effect of net operating income (NOI) on loan-loss provisions. Income smoothing appears to decrease over time, suggesting that while counter-cyclical provisions may have not avoided income smoothing behavior, they have at least reduced the impact of such earnings management over time. Nevertheless, income smoothing appears to be significantly larger in high loan-growth banks and at those banks which received government funding during the crisis.

As Figure VI shows, counter-cyclical provisions are apparently more effective in reducing procyclicality for banks showing a moderate loan growth rate than for those displaying a high loan growth. Furthermore, Table VI tests earnings and capital management for the subsample of 31 banks receiving government funds during the crisis. The results are completely in line with those for banks evidencing a high loan growth rate. All in all, these findings suggest that statistical provisions did not prevent excessive lending by banks.

VI. CONCLUSIONS

In this paper we examine the impact of the Spanish counter-cyclical loan-loss provision system upon managerial discretion regarding loan-loss provisioning and upon loan growth, analyzing a sample of 55 Spanish banks from 2000Q1 to 2010Q1. Our results suggest that the counter-cyclical system has significantly reduced the procyclicality of loan-loss provisions over time. We also find that counter-cyclical provisions have not prevented Spanish banks from employing various mechanisms for earnings management, although they have been effective in neutralizing the use of provisions to manage regulatory capital ratios. There is also evidence of a lack of institutional memory, leading many banks to excessive lending and a deterioration of credit quality. The results also suggest that although the intensity of earnings management may have decreased over time, this reduction has been substantially lower in banks showing high loan growth and for the group of 31 banks that were restructured or seized by the Bank of Spain during the crisis.

Overall, the empirical findings of this paper suggest that some of the primary and defining objective of reducing procyclicality have been achieved, via a system of counter-cyclical provisions. However, these provisions do not appear, by themselves, to have effectively reduced earnings management and excessive loan growth. This evidence is consistent with some preliminary assessments of the effectiveness of Spanish counter-cyclical provisions, suggesting that while dynamic provisions may effectively reduce procyclicality and act as a buffer for loan losses over the business cycle, they cannot prevent credit booms (Brunnermeier *et al.*,, 2009; Balla and McKenna, 2009; Sacasa, 2010).

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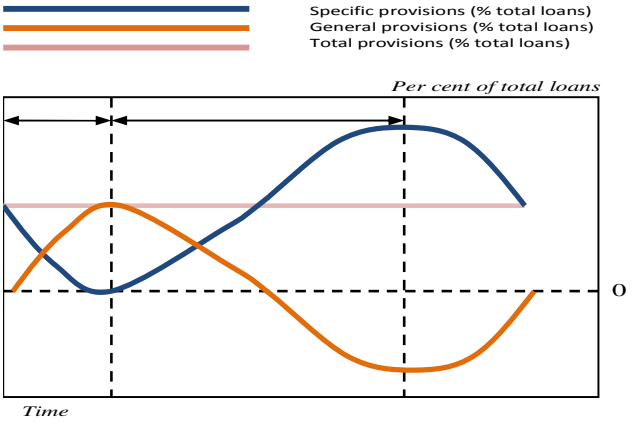
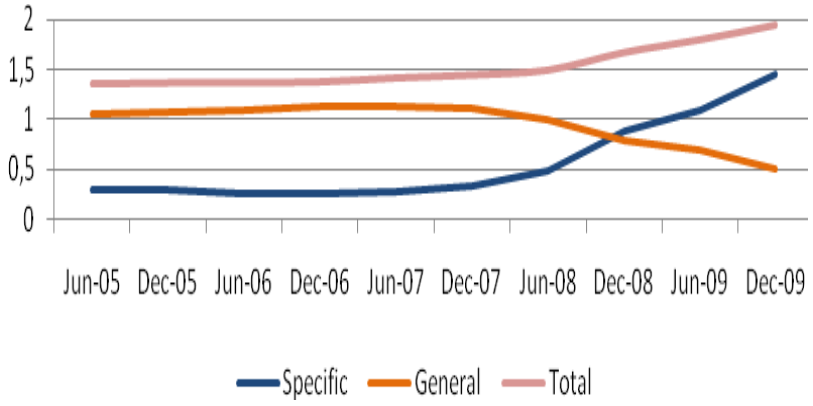
FIGURE I. DYNAMIC PROVISIONING: AN ILLUSTRATION



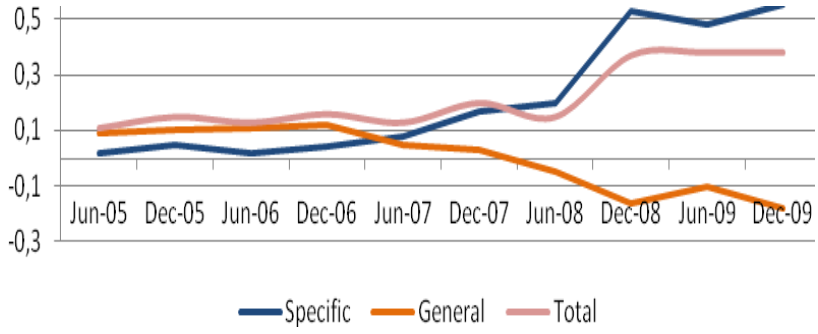
Source: Bank of England and authors' elaboration

FIGURE II. STOCK OF PROVISIONS IN SPAIN (2005-2009)
Provisions as % of total loans



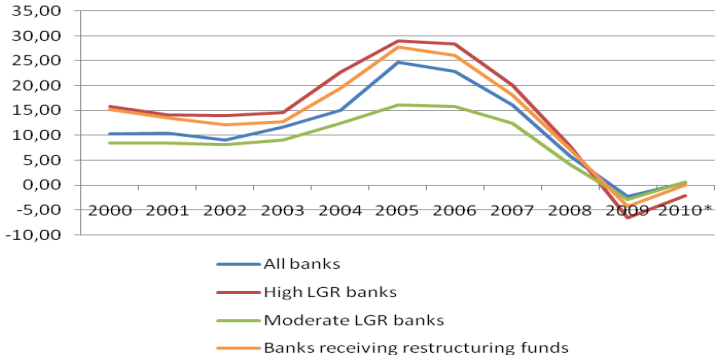
Source: Bank of Spain and authors' elaboration

FIGURE III. FLOW OF PROVISIONS IN SPAIN (2005-2009)
Provisions as % of total loans



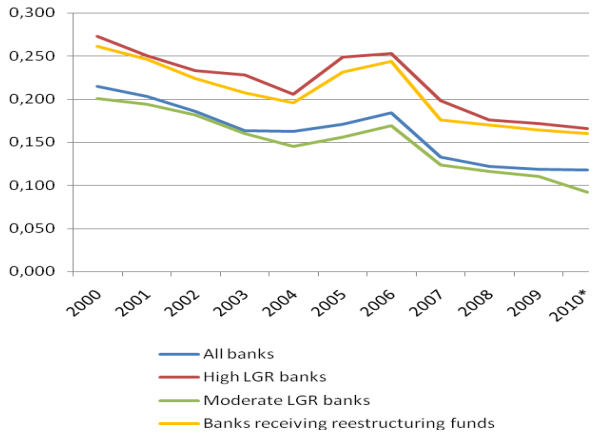
Source: Bank of Spain and authors' elaboration

FIGURE IV. LOAN GROWTH RATES: ALL BANKS, HIGH LOAN-GROWTH BANKS, LOW LOAN-GROWTH BANKS AND BANKS RECEIVING RESTRUCTURING DURING THE CRISIS



*: June 2010 w.r.t. June 2009

FIGURE V. EVOLUTION OF ESTIMATED INCOME SMOOTHING (NOI) PARAMETER (YEARLY OLS ESTIMATIONS)



*: June 2010 w.r.t. June 2009

FIGURE VI. EVOLUTION OF THE PARAMETER SHOWING THE PROCYCLICALITY OF LOAN-LOSS PROVISIONS (GDPG) BEFORE AND DURING THE CRISIS

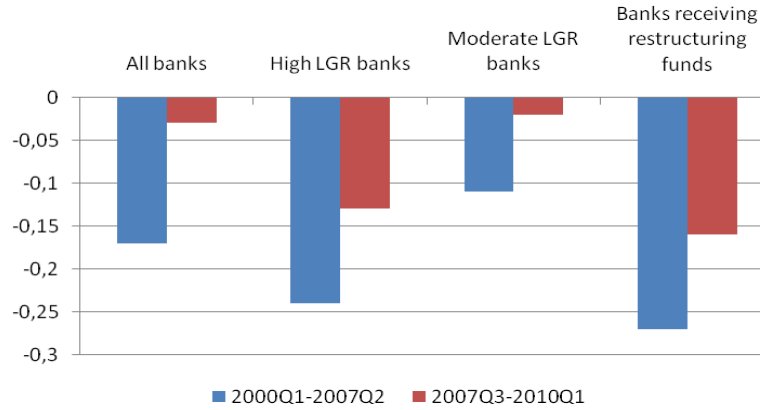


TABLE I. RISK CATEGORIES UNDER STANDARD APPROACH TO STATISTICAL PROVISIONING

Category	Description
Negligible Risk ($\alpha = 0\%, \beta = 0\%$)	Cash and public sector exposures (both loans and securities)
Low Risk ($\alpha = 0.6\%, \beta = 0.11\%$)	Mortgages with a loan-to-value ratio below 80 percent and exposure to corporations with a rating of "A" or higher
Medium-Low Risk ($\alpha = 1.5\%, \beta = 0.44\%$)	Mortgages with a loan-to-value ratio above 80 percent and other collateralized loans not previously mentioned
Medium Risk ($\alpha = 1.8\%, \beta = 0.65\%$)	Other loans, including corporate exposures which are non-rated or have a rating below "A" and exposures to small- and medium-size firms
Medium-High Risk ($\alpha = 2.0\%, \beta = 1.1\%$)	Consumer durables financing
High Risk ($\alpha = 2.5\%, \beta = 1.64\%$)	Credit card exposures and overdrafts

TABLE II. DESCRIPTIVE STATISTICS AND DEFINITION OF THE POSITED VARIABLES

	MEAN	STD DEV.	DEFINITION	SOURCES
PLL	0.44	0.47	Total net specific and general loan-loss provisions over total assets	Information of Prudential Relevance Reports for data from 2007 to 2009. For the remaining periods the information has been gathered from quarterly bank reports and publicly available information provided by the banks to the Spanish Securities Exchange Commission (CNMV), as well as from occasional reports and memos provided by the banks.
LGR	11.36	7.27	Loan growth (yearly)	Quarterly accounting statements published by the Spanish Banking Association (AEB) and the Spanish Confederation of Savings Banks (CECA).
NPL	2.37	1.66	Non-performing loans	Information of Prudential Relevance Reports for data from 2007 to 2009. For the remaining periods the information has been gathered from quarterly bank reports and publicly available information provided by the banks to the Spanish Securities Exchange Commission (CNMV), as well as from occasional reports and memos provided by the banks.
NOI	1.57	0.93	Net operating income	Quarterly accounting statements published by the Spanish Banking Association (AEB) and the Spanish Confederation of Savings Banks (CECA)
CAP	8.38	4.26	Capitalization (total capital/assets)	Quarterly accounting statements published by the Spanish Banking Association (AEB) and the Spanish Confederation of Savings Banks (CECA)
SPE	63.31	13.26	Specialization (loan-to-assets ratio)	Quarterly accounting statements published by the Spanish Banking Association (AEB) and the Spanish Confederation of Savings Banks (CECA)
LTA	15.23	2.03	Log (total assets)	Quarterly accounting statements published by the Spanish Banking Association (AEB) and the Spanish Confederation of Savings Banks (CECA)
ISS	0.46	0.35	Income smoothing symmetry: absolute value of the difference between the net operating income of bank *i* in period *t* and the average net operating income of bank i over the period	Quarterly accounting statements published by the Spanish Banking Association (AEB) and the Spanish Confederation of Savings Banks (CECA)
EEC	979	283	Expectations of economic conditions (general index of Madrid stock exchange)	Bank of Spain
GDPG	3.19	1.78	GDP growth	Spanish Statistical Office (INE)
MPW	22.13	8.46	Market power (Lerner index): (average price of earning assets-marginal costs)/average price of earning assets. Note: marginal costs are computed from a translog function with two outputs (loan and deposits) and three inputs (deposits, labor and physical capital)	Quarterly accounting statements published by the Spanish Banking Association (AEB) and the Spanish Confederation of Savings Banks (CECA)
RHPG	5.53	4.16	Real house prices (growth)	Spanish Statistical Office (INE)
1YE	3.68	2.26	1-year Euribor rate	Bank of Spain
EFF	0.59	0.38	Operating efficiency (cost-to-income ratio)	Quarterly accounting statements published by the Spanish Banking Association (AEB) and the Spanish Confederation of Savings Banks (CECA)
BGR	4.23	5.18	Branch growth rate	Quarterly accounting statements published by the Spanish Banking Association (AEB) and the Spanish Confederation of Savings Banks (CECA)
RoE	11.18	6.43	Return on equity	Quarterly accounting statements published by the Spanish Banking Association (AEB) and the Spanish Confederation of Savings Banks (CECA)

TABLE III. TEST OF DISCRETIONARY BANK MANAGEMENT AND INSTITUTIONAL MEMORY BEHAVIOR. ALL BANKS (2000Q1-2010Q1)

Dynamic panel data (system estimator)

Dependent variable	**PLL**	**PLL**	**NPL**
Hypotheses tested	***Procyclicality of provisions, income smoothing and capital management***	***Signaling behavior***	***Institutional memory*** [(a)]
p-values in parentheses			
PLL_{t-1}	0.193**	0.175**	0.207**
	(0.000)	(0.000)	(0.000)
NPL	0.218**	0.196**	-
	(0.000)	(0.000)	-
NPL_{t-1}	-	-	0.238**
	-	-	(0.000)
NOI	0.132**	0.143**	0.117**
	(0.003)	(0.002)	(0.004)
CAP_{t-1}	-0.003	-0.004	-0.003
	(0.271)	(0.318)	(0.271)
SPE	0.010**	0.012**	0.014**
	(0.008)	(0.007)	(0.004)
LTA	0.017	0.022	0.017
	(0.208)	(0.260)	(0.263)
ISS	0.019*	0.014*	-
	(0.013)	(0.015)	
EEC	0.004	0.003	0.002
	(0.103)	(0.185)	(0.117)
GDPG	-0.119**	-0.126*	-0.104**
	-0.009	-0.011	-0.008
MPW	0.006	0.004	0.005
	(0.093)	(0.076)	(0.123)
NOI_{t+1}	-	0.094*	-
		(0.034)	-
RHPG	-	-	-0.329**
			(0.002)
1YE	-	-	0.204**
			(0.003)
EFF	-	-	0.056*
			(0.033)
BGR_{t-4}	-	-	0.016*
			(0.020)
RoE	-	-	-0.206*
			(0.036)
LGR_{t-1}	-	-	0.007
			(0.172)
LGR_{t-4}	-	-	0.001
			(0.243)
LGR_{t-8}	-	-	0.019**
			(0.000)
LGR_{t-12}	-	-	0.028**
			(0.000)
Number of observations	2200	2145	1595
Durbin-Wu-Hausman test (p-value)	0.045	0.032	0.036
F-test for overall significance (p-value)	0.016	0.028	0.038

*,** : statistically significant at 5% and 1% levels, respectively

(a): in this equation, NOI, CAPt-1, SPE, LTA, EEC, GDPG and MPW enter with one lag.

TABLE IV. TEST OF DISCRETIONARY BANK MANAGEMENT BEFORE (2000Q1-2007Q2) AND DURING THE CRISIS (2007Q3-2010Q1)

Dynamic panel data (system estimator)

Dependent variable	**PLL**	**PLL**	**PLL**	**PLL**
Hypotheses tested	***Procyclicality of provisions, income smoothing and capital management***	***Signaling behavior***	***Procyclicality of provisions, income smoothing and capital management***	***Signaling behavior***
p-values in parentheses				
PERIOD	**2000Q1-2007Q2**		**2007Q3-2010Q1**	
PLL_{t-1}	0.138**	0.156**	0.215**	0.169**
	(0.000)	(0.000)	(0.000)	(0.000)
NPL	0.161**	0.170**	0.236**	0.206**
	(0.000)	(0.000)	(0.000)	(0.000)
NOI	0.138**	0.153**	0.123**	0.136**
	(0.003)	(0.002)	(0.003)	(0.003)
CAP_{t-1}	-0.002	-0.003	-0.004	-0.002
	(0.258)	(0.361)	(0.276)	(0.303)
SPE	0.012**	0.015**	0.008**	0.010**
	(0.009)	(0.008)	(0.007)	(0.007)
LTA	0.019	0.020	0.010	0.026
	(0.228	(0.315)	(0.253)	(0.284)
ISS	0.023*	0.018*	0.014	0.008
	(0.018)	(0.016)	(0.118)	(0.204)
EEC	0.006	0.008	0.006	0.005
	(0.134)	(0.215)	(0.195)	(0.230)
GDPG	-0.184*	-0.156*	-0.036**	-0.049**
	(0.018)	(0.021)	(0.007)	(0.008)
MPW	0.005	0.002	-0.007*	-0.005*
	(0.127)	(0.144)	(0.043)	(0.039)
ΔNOI_{t+1}	-	0.099*	-	0.032
		(0.028)		(0.162)
Number of observations	1705	1705	385	330
Durbin-Wu-Hausman test (p-value)	0.049	0.043	0.036	0.039
F-test for overall significance (p-value)	0.020	0.031	0.023	0.031

*,** : statistically significant at 5% and 1% levels, respectively

TABLE V. TEST OF DISCRETIONARY BANK MANAGEMENT FOR HIGH LOAN-GROWTH AND MODERATE LOAN-GROWTH BANKS (2000Q1-2010Q1)

Dynamic panel data (system estimator)

Dependent variable	**PLL**	**PLL**	**PLL**	**PLL**
Hypotheses tested	***Procyclicality of provisions, income smoothing and capital management***	***Signaling behavior***	***Procyclicality of provisions, Income smoothing and capital management***	***Signaling behavior***
p-values in parentheses				
Loan growth	**High LGR**		**Moderate LGR**	
PLL_{t-1}	0.126**	0.131**	0.193**	0.175**
	(0.000)	(0.000)	(0.000)	(0.000)
NPL	0.253**	0.246**	0.125**	0.138**
	(0.000)	(0.000)	(0.000)	(0.000)
NOI	0.289**	0.264**	0.132**	0.143**
	(0.002)	(0.002)	(0.003)	(0.002)
CAP_{t-1}	-0.006	-0.004	-0.003	-0.004
	(0.148)	(0.133)	(0.271)	(0.318)
SEP	0.014**	0.016*	0.004*	0.003**
	(0.010)	(0.012)	(0.016)	(0.009)
LTA	0.019	0.026	0.014	0.028
	(0.248)	(0.311)	(0.267)	(0.276)
ISS	0.028*	0.020*	0.011*	0.012*
	(0.024)	(0.016)	(0.018)	(0.023)
EEC	0.002	0.006	0.005	0.007
	(0.194)	(0.250)	(0.173)	(0.161)
GDPG	-0.235**	-0.249*	-0.063**	-0.033*
	(0.006)	(0.015)	(0.010)	(0.014)
MPW	-0.002*	-0.003*	0.008	0.006
	(0.041)	(0.035)	(0.189)	(0.107)
ΔNOI_{t+1}	-	0.129**	-	0.046
		(0.004)		(0.098)
Number of observations	550	495	1100	1045
Durbin-Wu-Hausman test (p-value)	0.049	0.042	0.038	0.044
F-test for overall significance (p-value)	0.023	0.031	0.025	0.043

*,** : statistically significant at 5% and 1% levels, respectively

TABLE VI. TEST OF DISCRETIONARY BANK MANAGEMENT FOR BANKS RECEIVING RESTRUCTURING FUNDS DURING THE CRISIS (2000Q1-2010Q1)

Dynamic panel data (system estimator)

Dependent variable	**PLL**	**PLL**
Hypotheses tested	***Income smoothing and capital management***	***Signaling behavior***
p-values in parentheses		
PLL_{t-1}	0.118**	0.124**
	(0.000)	(0.000)
NPL	0.264**	0.251**
	(0.000)	(0.000)
NOI	0.229**	0.224**
	(0.004)	(0.003)
CAP_{t-1}	-0.008	-0.012
	(0.182)	(0.123)
SPE	0.018**	0.019*
	(0.026)	(0.015)
LTA	0.006	0.007
	(0.293)	(0.504)
ISS	0.036**	0.027*
	(0.008)	(0.012)
EEC	0.004	0.009
	(0.131)	(0.215)
GDPG	-0.032*	-0.116*
	(0.012)	(0.015)
MPW	-0.004*	-0.005*
	(0.036)	(0.021)
ΔNOI_{t+1}	-	0.146**
		(0.003)
Number of observations	1160	1105
Durbin-Wu-Hausman test (p-value)	0.032	0.039
F-test for overall significance (p-value)	0.028	0.037

*,** : statistically significant at 5% and 1% levels, respectively