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# and signaling: the Spanish experience

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Introduction

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# ABSTRACT

While much research has been conducted in the United States on the use of loan loss provisions (LLPs) as a mechanism for managing earnings, managing capital, and as a tool for signaling future earnings strategies, there is a paucity of research in Europe. In this research, we replicate methodology used by Ahmed, Takeda and Thomas (1998) and examine the relative importance of key factors affecting the LLP decisions of Spanish depository institutions. Among others, we focus on the role of organizational structure. We specifically examine if and how LLPs are used prior to and after the implementation of capital adequacy regulations in the Spanish depository industry in 1992. Our results indicate that while LLPs were not used as a tool for managing capital after the new regulation came into effect, banks have now adopted a more aggressive earnings management strategy. This appears to be because the capital adequacy regulation of 1992 removed any capital constraint that hitherto acted as a disincentive to aggressive earnings management. Commercial banks appeared to adopt a more aggressive earnings management as well as capital management strategy than savings banks in the post regulatory era. Finally, we did not find evidence that LLPs were used as a signaling tool by Spanish banks to portray their intentions about future earnings.

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Banks, in general, set their loan loss provisions to reflect expected future losses on loans in their existing portfolios. Since these future losses cannot be estimated with certainty, bank managers have substantial discretion to set the provision. In theory, managers are supposed to use this discretion to provide best estimates of their portfolio's expected losses. In practice, however, managers may face substantial incentives to manipulate their loan loss provisions. The extant literature indicates that the loan loss provision (LLP) is a tool extensively used for the purpose of risk management, reducing earnings volatility, enhancing managers' compensation, and avoiding capital adequacy regulation. Federal bank and securities regulators do recognize the possibility of inappropriate earnings' manipulations and have developed common agreement that institutions should include a "margin for imprecision" that reflects the uncertainty associated with estimating credit losses in their portfolio (Montgomery, 1998). Similar views have been echoed by Turner and Godwin (1999). De Chow and Skinner (2000) note that with the increased importance of stock-based compensation, managers have become increasingly sensitive to the level of their firms' stock prices and their relation to key accounting numbers such as earnings.

In recent years, considerable work on loan loss provisions has been conducted in the United States. These studies focused on the relationship of LLPs and earnings management (Ahmed, Takeda & Thomas, 1998; Beatty, Chamberlain & Magliolo, 1995; Greenwalt & Sinkey, 1988; among others), relationship of LLPs and capital management (Beatty, Chamberlain & Magliolo, 1995; Collins, Shackelford & Wahlen, 1995; Kim & Kross, 1998; Moyer, 1990; among others) and the use of LLPs as a tool for signaling information to the stock market (Liu & Ryan, 1995; Wahlen, 1994; among others). However, there is a paucity of similar research in the European environment. The purpose of this study is to reduce this gap by examining the role of loan loss provisions (LLP) in earnings management, managing capital adequacy ratios, and as a tool for signaling in the Spanish banking industry. In this study we replicate the research of Ahmed, Takeda and Thomas (1998) who examined the role of loan loss provisions in capital management, earnings management, and as a tool for signaling in the U.S. banking industry.

Using the same methodology, but testing different hypotheses appropriate to the Spanish environment, we examine the role of LLPs in the Spanish environment.

In the United States, the introduction of capital adequacy regulation in 1990 spawned research on changes in earnings and capital management behavior. This new change in bank capital adequacy regulations limited the existing norms of capital ratio construction such as the use of loan loss provisions as components of regulatory capital. The change, in effect, reduced the costs of earnings management. Thus, one would assume that in the post regulation regime we would evidence more aggressive earnings management. The most recent study cited above tested this assertion (Ahmed et al., 1998).

In the European environment, capital adequacy regulations were imposed during the late 1980s and early 1990s with Spain adopting it in 1992. In this year the Spanish banking industry also became deregulated. In this paper, we primarily focus on two main objectives. First, to examine the changes, if any, of the use of loan loss provisions for capital management, earnings management, and signalling devices after the imposition of new capital adequacy regulations and deregulation.

The Spanish banking industry is important to study because it is representative of that of Europe in general. Similar to most European countries, the Spanish depository institutions consist of commercial and savings banks. Commercial banks are stock institutions funded by investors, and are hence responsible to external parties. Savings banks, i.e. mutual banks, on the other hand are owned by the depositors. These differences in organizational structures may have implications for earnings and capital management behavior patterns via the use of loan loss provisions (hereafter LLPs) after the imposition of the new regulation and deregulation.

Hence our second objective is to examine if these changes are equally applicable to the two main types of Spanish banking institutions. The purpose is to study how differences in organizational structure influence (if at all) the use of loan loss provisions as a tool for capital management, earnings management and signaling.

## Literature Review

As mentioned earlier, scores of research contributed to the role of LLPs in influencing capital and earnings management, and in some cases, contributing to the signaling processes of firm value. We summarize the key findings of the main papers.

Studies Examining the Relationship Between LLPs and Capital Management Moyer (1990) initially suggested that some managers adjust accounting measures, in particular the discretionary component of loan loss provision to manipulate the capital adequacy ratio, the purpose being to reduce regulatory costs imposed by capital adequacy ratio regulations. The results are consistent with the hypothesis that managers adopt ratio increasing accounting adjustments as the primary capital adequacy ratio declines relative to the regulatory minimum. In particular Moyer found evidence that banks manage capital using the loan loss provision. She also found evidence, which demonstrated that bank managers exercised discretion over the timing of reported loan loss provisions to avoid regulatory capital constraints. While many authors attempted to demonstrate that banks execute transactions to manage accruals to achieve capital, tax, and earnings goals, a common feature of these studies (including that of Moyer) was the assumption that when managers make a particular accrual or transaction decision, all other decisions are fixed. The significant criticism of the Moyer study is that while she examined the influence of loan loss provisions, loan charge-offs, and other accounting measures on capital management, she did not consider any interdependence among them. Beatty, Chamberlain and Magliolo (1995), developed a methodology that enabled examination when these decisions are made simultaneously. Their results were similar to Moyer's study that did not account for joint decision making.

In essence, they concluded that deviating from capital and earnings goals was costly and that bank managers trade off accrual and financing discretion to meet these goals. However, the results are mixed. While Moyer (1990) and Beatty et al. (1995) found evidence of a negative relation between loan loss provisions and capital ratios, Collins et al. (1995) do not find evidence of capital management. In summary, the preponderance of evidence suggests that LLPs are used as a tool to manage capital even though some studies find evidence to the contrary.

While the above papers were based on data prior to the 1990 capital adequacy regulation, a number of other papers also focused on the same issue using data from the post regulation period. Kim and Kross (1998) examined whether the level of loan loss provisions and write-offs declined in the new capital regime relative to the old regime. Their results indicated that, for low capital banks, LLPs declined

significantly after the new capital adequacy regulations. This is consistent with the notion that there is no incentive to increase LLPs to avoid minimum capital adequacy regulation since LLPs do not constitute an integral component of minimum capital requirements. This finding is corroborated by Ahmed et al. (1998). Studies Examining the Relationship Between LLPs and Earnings Management Some of the early studies showed convincingly that having stable earnings for commercial banks minimizes stock price volatility and maximizes shareholders' wealth. Scheiner (1981) in an early study rejected the position that commercial banks used loan loss provisions to smooth or manage income. Scheiner did find a positive correlation between operating income and loan loss provision and acknowledged that loan loss provisions provided a source of flexibility to adjust reported earnings. However, he attributed higher provisions to higher business failures and to more aggressive policies of bank managers. In a study examining the influence of loan loss provisions as a tool for earnings management among others things, Ma (1988) came to different conclusions. Ma showed that U.S. commercial banks used loan loss provisions and charge-offs to smooth reported earnings. In his study, he found no relationship between quality of loan portfolios and loan loss provisions. In other words, riskier portfolios did not appear to generate higher loan loss provisions. His results indicated that bank management tends to raise (lower) bank loan loss provisions in periods of high (low) operating income. The net impact of these adjustments resulted in a lower volatility in reported earnings. Ma concluded that loan loss provisions appeared to have no relationship to the quality of a bank's loan portfolio and were being aggressively used as a tool for earnings management. Collins et al. (1995) also found a positive relationship between earnings management and loan loss provisions. Their results also support the notion that LLPs are used to manage earnings. Studies in this area, especially in the U.S. are too abundant to enumerate. But in essence most studies including Beaver et al. (1989), Scholes et al. (1990),

Collins et al. (1995), Liu and Ryan (1995), Beaver and Engel (1996), and Liu et al. (1997), among others have found compelling evidence of earning management among banks. Healy and Wahlen (1999) enumerate the findings of these studies and conclude that earnings management is conducted by banks and that the reason (in part) is for stock market purposes.

Studies using data after the 1990 capital adequacy regulation era is limited to a well-executed paper by Ahmed et al. (1998). The authors did not find strong evidence of earnings management via loan loss provisions after the new capital adequacy regulation came into effect. This is somewhat surprising as one would expect to evidence more aggressive earnings management due to the new capital adequacy regulation. LLP as a Mechanism to Signal Private Information About Future Earnings Beaver et al. (1989) hypothesized that investors interpret an increase in LLP as a sign of strength. This was subsequently termed the signaling hypothesis. Beaver et al. suggested that loan loss provisions can indicate that management perceives the earnings power of the bank to be ufficiently strong that it can withstand a hit to earnings in the form of additional loan loss provisions. Wahlen (1994) found a positive relationship between unexpected LLPs and future preloan loss earnings changes as well as contemporaneous stock returns. Beaver and Engel (1996) observed that the valuation coefficients on the "discretionary" and "non-discretionary" components of LLPs are positive and negative, respectively, consistent with the signaling hypothesis. The signaling hypothesis was also investigated by Liu et al. (1997) to see if it

holds in a different time period after controlling for important economic determinants of loan loss provisions not included in prior studies. While they concluded it did, the evidence is mixed.

Ahmed et al. did not find evidence of a positive relation between LLPs and one-year ahead future change in earnings contrary to Wahlen (1994).

# Hypotheses

# **Capital Management**

In general, banks that face higher costs of violating capital requirements are likely to have greater incentives to engage in capital management. Capital adequacy is especially important in the merger approval process and regulators are thought to impose higher regulatory capital standards for banks that are actively involved in growth via mergers and acquisitions. Capital requirement regulations also act as a constraint to banks. This is because if a bank's capital is at or below the minimum capital level, the bank cannot issue more deposits or invest in additional loans.

Based on the above arguments, we expect banks with relatively higher costs of violating capital requirements to engage in more capital management. We expect this relationship to decline after the new capital adequacy regulations come into effect. The Spanish banking industry has two types of banks. Commercial banks are responsible to stockholders unlike savings banks that are privately owned. We expect, therefore, that commercial banks may have a greater incentive to manipulate loan loss provisions relative to savings banks.

Our hypotheses are summarized as follows:

H1a. The higher the cost of violating capital constraints, the more likely it is that banks will manage capital via loan loss provisions.

H1b. The relation between loan loss provision and capital will be less negative for banks in the new capital regime relative to the old regime.

H1c. Commercial banks will have a greater incentive to manipulate capital via loan loss provisions than savings banks.

# **Earnings Management**

As noted in the previous section, the preponderance of studies appears to find that loan loss provisions are used to manipulate earnings. In our hypotheses, we assume that managers have an incentive to smooth earnings. In particular, as Ahmed et al. (1998) note, when earnings are expected to be low, LLPs may be deliberately understated. In the old regime, such action would be costly since it would result in reducing the primary regulatory capital (Tier 1), moving the company closer to violation of capital adequacy ratios. In the new regime, the costs associated with this action would be removed. This is because it would have no effect on Tier 1 capital. In this scenario, we would expect commercial banks (that are responsible to stockholders and whose stock prices could be adversely affected by low earnings or higher volatility of reported earnings) to have a stronger incentive to manipulate. Hence, our hypotheses are stated as follows:

H2a. Overall, loan loss provisions will be positively associated with earnings.

H2b. The relation between loan loss provisions and earnings (before loan loss provision) will be more positive in the new capital regime than in the old regime.

H2c. The relation between loan loss provisions and earnings (before loan loss provision) will be more positive for commercial banks relative to savings banks in the new capital regime.

#### **Signaling Future Earnings**

Signaling theory assumes that LLPs may be used to signal financial health. As noted earlier, Beaver et al. (1989), Wahlen (1994), Beaver and Engel (1996), and Liu et al. (1997) all conclude that loan loss provisions are used as a signalling mechanism. As Ahmed et al. (1998) noted, "if signaling is an important incentive in choosing loan loss provisions, then we should observe a positive relation between loan loss provisions and changes in future pre-loan loss earnings," (p. 8). Hence our hypothesis, similar to that tested by Ahmed et al. is stated as follows:

H3. Loan loss provisions are positively related to one-year ahead changes in earnings (before loan loss provisions).

# The Spanish Banking System

Two key depository financial institutions operate in the Spanish economy: commercial banks and savings banks. Commercial banks include private domestic banks and foreign banks and have traditionally concentrated on corporate business and foreign exchange transactions, while savings banks have mainly offered services to households and small businesses in local areas. The rest of the depository industry is composed of smaller localized credit cooperatives. Commercial banks are privately owned by stockholders while savings banks are mutual institutions. These two sectors hold, on average, over 97% of the total assets of all domestic financial institutions.

In recent years, especially since 1991, the Spanish banking system has experienced a series of deregulation initiatives. The primary reason for the deregulation, and the liberalization from strict government controls, was to establish a competitive edge for the local banking and financial markets. This was considered particularly important after the removal of barriers to intercountry competition in financial services within the European Economic Community (EEC). The deregulatory experience lowered or kept the total number of institutions equal to the prederegulatory era number in all sectors. As shown in Table 1, however, there is a change in the market share with savings banks apparently more successful in enhancing their market share primarily at the expense of the commercial banks.

Unlike the smaller banking institutions in the United States, Spanish banks do not gain any tax advantage from the loan loss provisions and thus lack any incentive to deliberately use the provision for tax purposes. In this regard, Spanish banks are not significantly different from their U.S. counterparts especially with reference to their objectives of using the loan loss provision: (a) as a reserve for future expected losses; (b) as a signaling mechanism to clients and investors regarding future expected cash flow; and (c) to maintain smooth earnings streams to convey a signal of stable management.

Table 1. Spanish	Banking	System	(1986–1995)
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Year	Commercial Banks (Domestic)	Savings Banks	Credit Cooperatives	
Number of	institutions			
1986	97	79	138	
1991	108	57	106	
1995	109	51	97	
Percentage	share of industry assets			
1986	66%	31%	3%	
1991	62%	35%	3%	
1995	59%	38%	3%	
Assets in 1	,000 million pesatas (deflated GNP 1	986)		
1986	29.290	13.974	1.399	
1991	35.347	19.490	1.711	
1995	40.027	25.448	2.369	
Branch exp	pansion (number of branches)			
1986	16,518	12,831	n.a.	
1991	17.824	14.031	n.a.	
1995	17,897	15,029	n.a.	

Among the Spanish banks, saving institutions are mutual institutions while commercial banks are stock institutions. Institutions with mutual form of organizations have less incentive to use loan loss provision as an income smoothing strategy compared to their commercial bank counterparts who are under surveillance from corporate board and stock holders (Hasan & Hunter, 1999). Moreover, the deregulatory initiatives and the aggressive banking strategies adopted for enhancing market share gives us an opportunity to examine whether lending in non-traditional assets (or newly acquired expansion through branching) changes management strategy in using loan loss provision as an effective management tool.

#### **Data And Model Specifications**

Our data set consists of annual end of year information of all depository institutions constituting 970 observations of which 490 are commercial bank observations and 480 are savings banks observations during the 1986–1995 period. Data for savings and commercial bank are taken from the "Anuario de la Confederacion de Cajas de Ahorros" and in "Anuario Estadistico de la Banca Espanola" respectively. We were forced to delete some of the institutions due to lack of data across the time period of interest in our study. Descriptive statistics of the sample firms are shown in Table 2.

## Methodology

The following regression model was used to examine how LLPs are used in earnings management and capital management:

 $\begin{array}{l} LLP = a\ 0 + a\ 1\ LOSS + a\ 2\ UNEMP + a\ 3\ CAP + a\ 4\ EBT + a \\ 5\ SDUM + a\ 6\ POST + a\ 7\ ASSETS + a\ 8\ BRANCH + a\ 9 \\ CFEER + a\ 10\ SDUM \times CAP + a\ 11\ SDM \times EBT + a\ 12\ CAP \times \\ POST + a\ 13\ EBT \times POST + a\ 14\ SDUM \times CAP \times POST + a\ 15 \\ SDUM \times EBT \times POST \end{array}$ 

 
 Table 2. Descriptive Statistics for Savings Banks and Commercial Banks

Variables	Symbol	Savings Banks (n = 480)		Commercial Banks (n = 490)	
141		Mean	Std. Dev.	Mean	Std. Dev.
Loan loss provisions to loans outstanding	LLP	0.96	1.04	0.83	1.10
Loan losses to assets	LLA	0.89	0.99	0.99	0.61
Change in loan losses	LLOSS	-0.002	0.01	-0.001	0.03
Change in unemployment	UNEMP	0.01	0.06	0.04	0.01
Capital to minimum required	EBT	3.04	2.50	3.40	1.96
Stock returns	SRETURN	-	_	5.81	2.92
Book value of equity to assets	BVETA	5.73	3.48	6.81	2.04
Return on assets	ROA	1.96	0.58	2.01	1.14
Commission and fee income to total assets	CFEER	0.89	0.45	0.44	1.14
Number of branches	BRANCH	268	561	263	341
Number of ATMs	ATM	49	160	181	384
Total assets	ASSETS	579.920	1,406,30	346.80	616.184

where:

LLP = Loan loss provision to loans outstanding

LLOSS = Change in loan losses

UNEMP = Change in unemployment rates

CAP = Ratio of actual regulatory capital (primary or Tier 1 capital) before loan loss reserves to the minimum required regulatory capital

EBT = Earnings before taxes and loan loss provision/average Total assets

SDUM = Dummy variable (1 = stock or commercial banks; 0 = mutual or savings banks)

POST = Dummy variable (1 if post regulation or post 1991 (1992–1995) regime; 0 otherwise i.e. 1986–1991)

ASSETS = Log of total assets

BRANCH = Number of branches

CFEER = Commission and fee income to total assets

SDUM  $\times$  EBT = Interaction of type of bank with earnings before loan loss provision

 $CAP \times POST = Interaction of capital and type of regime$ 

 $EBT \times POST = Interaction of earnings with type of regime (1 if new capital$ 

Regulation regime; 0 otherwise)

 $SDUM \times CAP \times POST = Interaction of type of bank with ratio of regulatory capital and type of regime$ 

SDUM  $\times$  EBT  $\times$  POST = Interaction of type of bank with earnings and type of regime.

In the above regression, LLOSS and UNEMP are internal and external indicators of the level of risk faced by a bank. Increase in loan losses would necessitate that the bank increases its loan loss provisions to take account of the additional risk. Similarly UNEMP is used as a surrogate for economic activity. Increased unemployment indicates a slump in the economy that may accentuate the risk of loan default for banks.

The organizational form dummy variable (SDUM) takes on the value of 1 if the banking institution is a commercial bank and 0 if it is a savings institution.

Unlike mutual institutions, the stock form of organizations has direct monitoring or profit making pressure from stockholders (owners). Therefore, their managers may have a greater incentive to manipulate income. Similarly, the capital regime dummy variable (POST) takes on the value of 1 if the period is post regulation (1992–1995) and 0 otherwise (1986–1991).

The log of total assets is another control variable that measures the size of the bank. In general, larger banks may have higher levels of business and may be expected to have higher loan loss provisions than smaller banks. CFEER is commission and fee income as a proportion of total assets. A higher income in this category indicates an interest in non-depository banking activities and thus relatively less dependency on traditional lending activities. It is plausible that these institutions are more active in allocating appropriate loan loss reserve estimates in order to provide an image of a "safer financial institution" providing multiple services for clients. One may argue the contrary stating that, given most of the traditional income for depository institutions come from deposits and lending activities, commissions and fees may represent an aggressive and non-traditional mode of banking activity. Banks involved in such non-depository activity and strategy may have experienced higher credit risk and thus may allocate inflated amounts to the loan loss provision for the purpose of off setting risks associated with an anticipated uncertain future.

The branch variable (BRANCH) is used to measure the geographic or distributional intensity of financial institutions. Institutions with large branch networks may have a well-diversified loan portfolio and expect lower credit problems and thus are less likely to keep higher provisions for loan losses. On the other hand, it can also be argued that banks with large networks may have less control of its lending and related credit activities and, hence, may be expected to keep larger provisions for loan losses to handle unexpected adverse credit events which may surface in the branch network.

In the model, CAP  $\times$  POST represents the interaction between capital adequacy ratios and type of regime. Our understanding from Moyer (1990) and Beatty et al. (1995) is that the loan loss provision changes are inversely correlated to the divergence from capital adequacy ratios. EBT  $\times$  POST represents the interaction of earnings and the capital regime period. If earnings management is more aggressively pursued in the post regulation regime period, we would expect the coefficient of this variable to be significant and positive. Finally, SDUM  $\times$  CAP  $\times$  POST indicates the interaction of the bank type with capital adequacy ratio and the type of regime (post capital regulation). Given the coding of the dummy variables, if the incentive to use LLPs to manage capital is reduced, we would expect the coefficient of this interaction variable to be significant and negative.

#### **Empirical Results**

The regression results are shown in Table 3. We report the results from four regression models that incorporate different independent variables. The first regression model does not include the interaction variables. The second model has, in addition, the SDUM  $\times$  CAP and SDUM  $\times$  EBT interaction variables, while the third model also incorporates the two-way interaction variables, CAP  $\times$  POST and EBT  $\times$  POST. The fourth model also includes the two three-way interaction variables, SDUM  $\times$  CAP  $\times$  POST and SDUM  $\times$  EBT  $\times$  POST.

The model statistics for the first regression model reveal that the basic model (reported in column 1) explains almost 48% of the model with marginal increases obtained by adding additional interactive variables (second, third, and fourth regression models reported in columns 2, 3, and 4). In all estimates, the R2 and F-statistics show strong model statistics.

The results in the first model indicate that, overall, loan loss experience, economic activity, the level of the capital adequacy ratio, level of earnings, non-traditional banking activity, and extent of branch networks all significantly influence the level of LLPs. The change in actual loan loss is positively associated with LLP levels. Similarly, the variable UNEMP is positively associated with LLPs indicating that a slump in the economy (as characterized by rising unemployment rates) force banks to increase their loan loss provisions. The branch variable is negatively correlated with LLPs implying that banks with a greater number of branches (indicating more dispersed lending activities) have lower loan loss provisions. Interestingly both capital and earnings are significantly associated with LLP. The negative sign of the CAP ratio indicates that, overall, the lower the capital ratio (i.e. the closer it moves to the minimum required capital), the higher the loan loss provision. This is consistent with the findings of Moyer (1990) and Beatty et al. (1995) that loan loss provisions are used as a mechanism to increase loan loss reserves and hence the capital ratio of which the loan loss reserve was, prior to 1992, an integral component. This finding supports hypothesis H1a that Spanish banking institutions manage capital using loan loss provisions. Similarly, earnings are significantly and positively associated with LLP. This is also in accordance with earnings management theory discussed in the literature review section. This finding supports hypothesis

H2a that states loan loss provisions will be used to manipulate earnings, hence implying a positive relationship. The sign of the coefficient indicates that, as earnings decline, loan loss provisions are reduced in order to manage earnings.

Thus, it would appear that overall, for the whole sample, when interactions are not taken into account, both earnings management and capital management did occur.

The negative coefficient of SDUM and POST indicate that commercial banks and post-capital adequacy regulation regime experienced less loan loss provisions. Moreover, the CFEER coefficient indicates that banks with greater non-traditional banking activities are less likely to have higher loan loss provisions in their books. These findings are consistent with the theory in the published literature.

The second regression model in column 2 of Table 3 incorporates two inter-actions, namely, SDUM  $\times$  CAP and SDUM  $\times$  EBT. As shown in Table 3, the relationship in the first model still holds true. The coefficient of the SDUM  $\times$  CAP interaction variable is negative and significant at p-value 0.01 level. This indicates that commercial banks or stock institutions use loan loss provisions to manage capital in order to avoid violation of minimum capital requirements. This finding supports hypothesis H1c that states that commercial banks (who are responsible to investors and whose stock prices may be adversely affected) will have a greater incentive to manipulate loan loss provisions to avoid violating capital adequacy regulation. Similarly, the coefficient of the SDUM × EBT interaction variable is positive and significant at the p-value 0.05 level. This indicates that stock institutions are more aggressive in earnings management using loan loss provisions.

The third regression model in column 3 of Table 3 incorporates two more inter-action terms. The coefficient of the  $CAP \times POST$  is positive and significant at the p-value of 0.01 level. This indicates that in the post capital regulation regime, low capital adequacy ratios did not cause managers to increase loan loss provisions. On the contrary, LLPs appear to have been reduced. (Under the old regime this would have moved banks closer to violation of minimum capital requirements, but this is not an issue in the new post regulation regime.) This finding supports hypothesis H1b that states that the relation between loan loss provision and capital will be less negative for banks in the new capital regime relative to the old regime. Under the new regime, the negative coefficient indicates that banks had other priorities such as increasing earnings. H1c posited that commercial banks would have a greater incentive to manipulate capital relative to savings banks. However the coefficient of the SDUM  $\times$  CAP variable is not significant. We conclude that there is not sufficient evidence to support this hypothesis. The coefficient of the interaction variable EBT  $\times$  POST indicates a positive relationship that is significant at a p-value of 0.05. This indicates that in the new regime lower earnings caused companies to reduce LLPs. This finding supports hypothesis H2b that states that the relation between loan loss provisions and earnings (before loan loss provision) will be more positive in the new capital regime than in the old regime. Thus, in the new regime, the level of capital no longer appears to influence loan loss provisions and earnings management appears to be pursued more aggressively.

The fourth regression model in column 4 of Table 3 incorporates two additional three-way interactions. These interaction variables help to further test hypotheses H1c and H2c. The coefficient of the SDUM  $\times$  CAP  $\times$  POST is positive but only significantly different from zero at the 10% level. While H1c postulated that commercial banks will have a greater incentive to manipulate capital, we further conclude that there is not sufficient evidence to support H1c since the coefficient was only significantly different from zero at the 10% level that we consider marginal. The coefficient of the SDUM  $\times$  EBT  $\times$  POST is positive and significantly different from zero at the 1% level. This finding supports hypothesis H2c, which states that the relation between loan loss provisions and earnings (before loan loss provision) will be more positive for commercial banks relative to savings banks in the new capital regime.

Table 3 examines earnings management and capital management behavior of banks via loan loss provisions. Table 4

examines whether loan loss provisions are used as a tool for signaling future earnings (i.e. the signaling theory).

The regression model employed was:

LLP = a 0 + a 1 LLOSS + a 2 UNEMP + a 3 CAP + a 4 EBT + a 5 CAP  $\times$  POST + a 6 EBT  $\times$  POST + a 7 EBTP where:

EBTP = one year ahead change in earnings (all other variables as defined earlier).

In this model, we examine whether loan loss provisions are related to future earnings changes after controlling for economic determinants of loan loss pro-visions using regressions similar to those in Table 3 augmented by the change in one-year ahead earnings before taxes and loan loss provisions. If signaling of this type is an important determinant of loan loss provisions, then we should observe a positive relation between the one-year ahead change in earnings and loan loss provisions as reported in Wahlen (1994) and others. This is because signalling theory postulates that increase in LLPs are used to signal good news about future earnings changes.

The first regression in column 1 of Table 4 presents the results of the augmented regression. The coefficient of the oneyear ahead change in earnings is negative and significantly different from zero at the 1% level. The sign of the coefficient and its significance is not consistent with the signaling hypotheses. The results do not support hypothesis H3. The results are not consistent with the findings reported in Wahlen (1994) who concluded that the signaling hypothesis was valid. The results here are, however, consistent with the findings of Ahmed et al. (1998) who did not find evidence of the signaling hypothesis in the United States.

The second regression in column 2 is identical to the first regression in column 1 of Table 4 except that we incorporate two control variables, namely, SDUM (a dummy variable representing bank type, 1 if commercial, 0 otherwise) and an interaction variable SDUM  $\times$  POST (where post is a dummy variable, 1 if post capital regulation, 0 otherwise). We included SDUM and SDUM  $\times$  POST since commercial banks, especially post regulation, may have a greater incentive to use LLPs after the new regulations came into effect. The coefficients of both these variables were not significant. Overall, the coefficient of the one-year ahead change in earnings was still negative and significantly different from zero at the 1% level. Thus, we do not find evidence to support the signalling hypothesis.

To further understand this phenomena, we reexamined the signaling hypothesis using Wahlen's (1994) model that was also used by Ahmed et al. The regressions are shown in columns 3 and 4 of Table 4. In these models we only used commercial banks for which consistent stock market return data was available.

The model examined in column 3 is as follows:

$$\label{eq:estimate} \begin{split} & EBTPMVE(t+1) = a \ 0 + a \ 1 \ CAP \times POST + a \ 2 \ EBT \times POST + a \ 3 \ EBTPMVE + a \ 4 \ ULLPMVE \end{split}$$

### where:

EBTPMVE(t+1) = Future (one year ahead) change in earnings before provisions and taxes (divided by market value of equity at the beginning of that year)

CAP = Ratio of actual regulatory capital before loan loss reserves to the minimum required regulatory capital

POST = A dummy variable which equals in the new capital regulation regime and 0 otherwise

EBTPMVE = Change in earnings before provisions and taxes (divided by market value of equity at the beginning of the year) ULLPMVE = Unexpected loan loss provision measured by the residuals from a regression of loan loss provisions (deflated by beginning of year market value of equity) on expected change in non-performing loans, beginning of year loan loss allowance, beginning of year non-performing loans, and five loan composition variables all deflated by beginning of year market value of equity. The expected change in non-performing loans is the predicted value in regression of change in non-performing loans and the 5 loan composition variables all deflated by beginning of year market Value of equity.

The models in columns 3 and 4 presents tests of signaling using the valuation approach used in Beaver and Engel (1996) and Ahmed et al. (1998). Regressions were run using the Wahlen and Ahmed et al.'s model for discretionary LLP provision and empirical specifications. Columns 3 and 4 of Table 4 present the results of the models. The model presented in Table 4 is a similar regression to that of column 3 but only including EBTPMVE and ULLPMVE. In essence, the results in both indicate that the relation between future earnings changes and the discretionary component of the loan loss provision remain negative and significantly different from zero at the 5% level. This is not consistent with the signaling hypothesis, which would postulate a positive relationship. These results are, however, consistent with Ahmed et al. who also found no evidence for signaling theory in their sample of U.S. banks. Conclusions

It is important to understand whether banks use tools such as the loan loss provision to manage earnings and avoid minimum capital adequacy regulations. Much research has already been conducted in the United States in the area of earnings management and capital management via loan loss provisions. However, not much research has been conducted in the European environment. It is important for European regulators to understand if and how mechanisms such as the loan loss provision are used to manage earnings to inflate stock prices, as a signaling device, and as a tool to manage capital. Such knowledge can help regulators understand if the reported numbers are truly meaningful or are subject to manipulation. Arthur Levitt, Chairman of the Securities Exchange Commission in the United States, stated that, in the U.S., managing has become "manipulation" and integrity has been substituted by "illusion" (Levitt, 1998).

This study provides information to Spanish regulators, investors and other stakeholders on the accuracy of reported numbers in their country. The Spanish banking industry is important to study because it is representative of that of Europe in general. Similar to most European countries, Spanish depository institutions consist of commercial and savings banks. While savings banks are owned by their depositors, and hence, not responsible to external parties, commercial banks are owned by stockholders, and managers of commercial banks are responsible to stockholders for the annual performance of those banks. Managers of such banks may have an incentive to use tools to manipulate numbers in their favor especially after the 1992 deregulation. Lower monitoring as a consequence of deregulation may act as an incentive to banks to use tools at their disposal to manage earnings and capital.

In the U.S., capital adequacy regulation enacted in 1990 could have influenced banks' behavior by ruling that loan loss reserves would not constitute an integral part of required minimum capital that banks are required to hold. This may have had the unintended consequence of stimulating more aggressive earnings management behavior by banks. (This is because, prior to this regulation, reducing loan loss provisions to inflate earnings had the unintended consequence of reducing loan loss reserves, which in turn, constituted an important component of

the capital adequacy ratio.) Thus, prior to the new regulation aggressive earnings management had costs associated with it. (Namely, the cost of moving closer to violating capital adequacy ratios.) This cost has now been eliminated. In Spain too, under new and similar capital regulation enacted in 1992, this cost has been eliminated.

Our results indicate that, overall, LLPs were used as a tool for avoiding capital adequacy regulation. Similarly, overall, LLPs were used as a tool for earnings management. We found that LLPs were not used as tool for managing capital after the new regulation came into effect. This intuitively makes sense. We also found that banks have adopted a more aggressive earnings management strategy after the new capital adequacy regulation came into effect. This is plausible since there is no capital constraint to act as a disincentive to aggressive earnings management. We would have assumed that commercial banks would be pursuing earnings management strategies relative to savings banks. Although the results indicated that this was true, it was not statistically significant. This is somewhat surprising. Finally, unlike in the U.S., we did not find evidence that Spanish used LLPs as a tool to signal their intentions about future earnings.

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