Earnings- and Capital-Management and Signaling: The Use of Loan-Loss Provisions by European Banks

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Abstract

Extensive research conducted in the U.S. explored the role of loan-loss provisions in capital and earnings management, and signaling for future earnings before and after the enforcement of the 1988 Basel Accord in 1990. To date, few studies have examined these relationships in the European context. In this paper, we conduct an analysis to examine the relationship between loan-loss provisions (LLPs) and earnings management, and the association between LLPs and capital adequacy requirements through a comparison of 14 European Union countries (15 countries belonging to the European Union as of December 1996, with the exception of Spain, due to the "statistical" provision regime introduced in June 2000 by the Banco de España), and 23 non-EU countries. We also test whether, as in the U.S., loan-loss provisions are used as a tool to signal managements' expectations concerning future bank profits to investors, and, finally, we investigate the impact of some cross-country determinants on bank income smoothing, such as bank regulation and bank supervision.

Overall, we find evidence that: (i) loan-loss provisions reflect changes in the expected quality of a bank's loan portfolio, measured by the change in the amount of nonperforming loans; (ii) capital management is an important determinant of LLPs for EU banks, but not for non-EU banks; (iii) earnings management is an important factor affecting provisioning decisions for both EU and non-EU banks; (iv) the desire to signal private information to outsiders is an important factor in explaining provisioning policies for non-EU banks, but is not important for EU credit institutions; (v) bank LLPs are characterized by a pro-cyclical nature; and, finally, (vi) restrictions on bank activities, official and private supervisory have a different impact on income smoothing practices at EU and non-EU banks, in the sense that they reduce incentives to smooth earnings in non-EU banking systems.

EFMA classification codes: 510, 520, 180, 710

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1. Introduction

Loan-loss provisions (LLPs) are one of the main accrual expenses for banks. They are set aside by bank managers to face a future deterioration of credit portfolio quality. Hence, the role they play within a bank's financial statements is crucial, given the sensitive information they are supposed to convey. If, in principle, LLPs must be used to cover expected losses, however, due to the discretion bank managers can exploit in estimating this item, provisioning policy can become an important tool to pursue goals that are different from a fair representation of the expected evolution of a bank's loan losses.

With regard to loan-loss provisions, prior research suggests four central reasons to explain managerial discretionary behavior: income smoothing, signaling, capital regulation, and taxes. Yet, empirical evidence finds contrasting results, with the exception of the tax motivation, and is mostly focused on U.S. banks. Most of these works draw on the introduction of the capital adequacy regulation in 1990,[†] and attempts to detect the potential changes in banks' behavior in earnings and capital management via LLPs. As pointed out by Lobo and Yang (2001), the lack of consistent evidence may be due to the use of different model specifications, or, alternatively, may be induced by the fact that, over time, managers' incentives have not been steady.

The main purpose of this study is to examine the use of loan-loss provisions to manage earnings and regulatory capital ratios, and to signal managers' private information concerning future earnings within the European banking industry. As stated, there is a relative paucity of research related to the European banking systems. For example, Fonseca and Gonzàlez (2008) study the determinants of income smoothing by managing LLPs in banks the world over, including several European countries. They find that income smoothing is influenced by different institutional factors, in particular, it is negatively related to: investor protection, accounting disclosure, restrictions on bank activities, and external and internal supervision; to the contrary, bank managers are more engaged in smoothing income in market-oriented and more developed financial systems. Perez *et al.* (2006) test the use of loan-loss provisions for income smoothing and capital management within the Spanish banking system, finding evidence that supports income smoothing but not capital management.

Our analysis is developed on a sample of 907 European banks over the period 1996 - 2006, and aims at detecting whether banks located in the European Union countries – i.e., the 15 countries which were part of the Union as of December 1996, with the exception of Spain – behave in a different way relative to the credit institutions from the non-EU group.[‡] Overall, we find that: loan-loss provisions reflect changes in the expected quality of banks'

[†] The rules proposed by the 1988 Basel Accord (see Basel Committee on Banking Supervision (1988)) have been implemented in the U.S. in 1990 with the introduction of interim risk-based capital guidelines.

[‡] Spain is not included because of the regime of "statistical" provisions introduced by the Banco de España in June 2000. The non-EU group comprises Andorra, Albania, Armenia, Azerbaijan, Bosnia-Herzegovina, Bulgaria, Belarus, Switzerland, Georgia, Croatia, Iceland, Liechtenstein, Monaco, Moldova, Montenegro, Macedonia, Norway, Romania, Serbia, Russian Federation, San Marino, Turkey, and Ukraine.

loan portfolio; capital management is an important determinant of loan-loss provisions for EU banks but not for non-EU banks; earnings management is strongly supported for both EU and non-EU banks; non-EU credit institutions do use loan-loss provisions to signal private information to outsiders, whereas EU banks do not; bank loan-loss provisions follow a pro-cyclical trend; and, finally, restrictions on bank activities, official and private supervisory have a different impact on income smoothing practices at EU and non-Eu banks, meaning that they reduce incentives to smooth earnings in non-EU banking systems.

The remainder of this paper is organized as follows. In section 2, we briefly summarize the current regulatory setting, which plays an important role in explaining bank managers' behavior. Section 3 provides a literature review, developing the rationale for managers to use their discretion in estimating loan-loss provisions. Section 4 describes the data, the sample selection process, and the methodology we adopt in our analysis. In section 5 we present and discuss the results of our empirical evidence, presenting some robustness tests in section 6. Section 7 provides an analysis of the impact of some cross-country determinants, such as bank regulation and supervision, on bank income smoothing. Section 8 concludes the discussion with a brief summary.

2. Provisioning policies within the European banks: between Basel II and IAS regulatory frameworks

Historically, accounting rules have pursued two different and alternative goals: the conservative valuation of assets, and the accurate measurement of each period's net income. The latter has been traditionally emphasized by the American accounting system, while the prudential approach stands as the basis of the accounting rules in Europe. The steps that banks follow in their loan-loss accounting are basically the same around the world, and are well-established, even if the underlying principles may significantly differ, and are the source of ongoing controversy.[§]

In the recent past, loan-loss accounting received enormous attention from both banking supervisors and international accounting authorities, dealing with the subject from different perspectives, with different goals to achieve, and occasionally generating issues related to the lack of coordination. On the one hand, and in principle, the Basel Committee on Banking Supervision, pursuing its statutory objective of soundness and safety of the international banking industry, generally requires that banks use accounting principles reflecting prudent and conservative valuations. Furthermore, from its point of view, provisions shield against future losses, and, consequently, must be set up to face expected

[§] For a description of the procedure and the principles of loan-loss accounting, see Hasan and Wall (2004). In particular, see that paper for details about the loan-loss accounting process of U.S. banks. As to banks from other countries, Hasan and Wall say that the main procedural difference is the distinction between specific and general loan-loss allowances. The former type of provisions is set aside versus individual problematic loans, while the generic allowances are accumulated in order to face default risk associated to groups of loan, based on bank's historical experience.

losses.

In contrast, accounting regulators favor provisioning policies based on loan losses which actually affect banks and that can be objectively proven. Developing a common set of accounting rules, obtaining higher levels of accounting information transparency and quality are the purposes of both the International Accounting Standards Committee (IASC), and its successor, the International Accounting Standards Board (IASB). In this regard, the European Commission has proposed that all European banks – like all European firms listed on a regulated exchange – by the year 2005, must prepare consolidated financial results according to the International Accounting Standards (IAS).

In particular, amid the new international accounting standards, IFRS/IAS 39 involves the banks' evaluation of their credit portfolio: loan assessment must be based on the amortized cost, i.e., the current value of related, expected cash flows which are supposed to decrease if the borrower experiences some financial difficulty.[**] What's more, IFRS/IAS 39 states that loans must be recorded in the bank balance sheet at their nominal value – i.e., the result of their amortization plan – unless objective proofs of deterioration occur. In this case, loan value is the current value of its expected cash flows, and the difference of the former value must be charged on the bank profit and loss account. As to the net charge-offs, IAS 39 refers to the concept of *incurred loss*: according to the regulatory framework, adjustments are allowed only to face losses that already occurred (or that are presumed, but on the basis of an event already occurred, though after the loan was granted). Therefore, banks cannot set provisions aside based on expected future loan losses, even if those provisions are estimated by means of the statistical methods which bank internal rating systems are founded on.

The above described set of rules clearly represents a step forward in the direction of a higher level of accounting transparency. Nevertheless, critics remark that the new accounting rules make bank returns more volatile, and lending policies even more pro-cyclical than the past since building the so called "statistical reserves" against expected losses becomes more and more difficult.[††] Pro-cyclicality is one of the main issues related to those regulatory frameworks which impose capital requirements to face loan losses to be calculated as a percentage of bank risky loans. Referring to supervisory capital requirements, pro-cyclicality means that they are higher during bad times, when economic conditions get worse, and lower in case of economic upturn. Due to the difficulty in raising

[**] On December 2000, the Joint Working Group of Standard Setters (JWG), a committee constituted of the IASB and the national authorities in charge of defining domestic accounting principles, proposed to use the *fair value* criterion to evaluate all financial instruments, including bank loans and deposits. Banking industry, meaning both banks and supervisory authorities, expressed some concerns about the adoption of the *fair value* approach, basically because of the lack of an effective secondary market for loans and deposits, and due to the effects, in terms of profit volatility, the rule could have on bank balance sheets. That's the reason why, for bank loans, the *fair value* was replaced by the *amortized cost* mentioned above.

[††] Furthermore, it is interesting to note that charge-offs cannot be offset by a reduction in loan-loss allowances since IAS 37 doesn't allow any more their presence within bank balance sheet's liabilities. Consequently, write-offs are directly charged on the profit and loss account.

new capital during economic recession, in order to keep the ratio between capital and risky loans above the minimum, banks should reduce the size of their lending activity, thus stressing firms' financial issues (being pro-cyclical in stressing the negative impact of the cycle too). The mechanism works in the reverse during a period of upward economic trend.

In terms of provisioning policies, the attitude of banks during the different phases of the economic cycle works in the following way: when economic conditions are not good, and the number of defaults gets higher, intermediaries tend to increase loan-loss provisions, while during periods of economic growth provisions tend to diminish. Bank provisioning policies can make a capital requirements system more or less pro-cyclical, depending on what kind of losses capital requirements are designed to face. If it is the only unexpected loss, provisioning policies opposed to those described above, can reduce their pro-cyclical impact since banks would increase loan-loss provisions during good periods, with good profit margins, while they would draw from these reserves in bad times when the credit loss amount gets higher. If capital requirements are designed to cover also the expected loss, pro-cyclicality stretches to the provisions as well. Consequently, an anti-cyclical behavior, in terms of provisioning policies, can offset the pro-cyclical nature of a capital requirements-based regulatory framework.[‡‡] That is what the so called "dynamic" provisioning policies do: they can reduce capital requirements pro-cyclicality since they increase (reduce) provisions during phases of economic growth (slowdown) and high (low) bank profits.[§§] On the contrary, if provisioning policies were based on actual losses, they would end to stress pro-cyclicality because losses are higher during economic recessions.

Risk-based capital standards first came into effect with the 1988 Basel Accord, requiring all banks to have a minimum qualifying total capital to risk weighted assets ratio of 8 percent. At least one half of the total regulatory capital must be in the form of the highest quality capital, also known as Tier 1 capital, consisting of common stockholders' equity, some qualifying preferred stocks subject to certain limitations, and the minority of interest in the equity accounts. The remaining component, otherwise referred to as Tier 2 or supplementary capital, admitted within the limit of 100% of Tier 1 capital, included asset revaluation reserves, undisclosed reserves, hybrid capital instruments, subordinated debt,

[‡‡] In this regard, Fonseca and González (2008) highlight how analysis of the use of loan-loss provisions must take into consideration the interest of supervisory authorities in reducing pro-ciclicality. The idea is that banks and regulators set a certain level of protection against credit losses, both the expected and the unexpected ones. Since, as they say, "*credit risk is built in a boom and materializes in a downturn*", banks should set provisions aside in good times and draw from the reserves in bad times. In this way, in case of a random shock, provisions should be positively correlated with income and economic cycle to keep the level of protection at the ideal value set with the regulators.

[§§] According to a dynamic provisioning system, loan-loss provisions are built up upon the loan is granted, proportionate to the long-run expected loss of the different counterparties. "*By design the dynamic provision produces flat loan loss provision ratios (i.e. loan loss provisions over total loans) through the economic cycle* [Perez et al. (2006)]. Among the European banking systems, Spain adopted a dynamic provisioning approach in 2000, because of the strong lending growth of the '90s. For further details about the Spanish regulatory framework, see Perez et al. (2006).

and general provisions and loan-loss reserves.[***] To prevent from including within the regulatory capital items without the essential characteristics of capital, the Committee stated that general provisions and loan-loss reserves could be included only if they were "*not ascribed to particular assets and do not reflect a reduction in the valuation of particular assets*." In fact, if provisions were created to face identified losses or against a demonstrable deterioration in the value of particular assets, they should not be included in the capital because they are not freely available to meet unidentified losses "*which may subsequently arise elsewhere in the portfolio.*"[†††]

The recently approved, modified discipline, the so called "Basel II," confirms the two tier-structure of regulatory capital,[‡‡‡] and still requires general loan-loss provisions to be freely available to meet unidentified losses to be part of the total qualifying regulatory capital. Furthermore, Basel II introduces a different treatment for loan-loss provisions depending on the approach banks adopt to manage credit risk. Under the standardized approach, general provisions/loan-loss reserves can be included in Tier 2 capital up to the limit of 1.25% of Risk Weighted Assets (RWAs). Banks adopting the Internal Rating Based (IRB) approach should use loan-loss provisions to cover expected losses, but must face unexpected losses raising adequate capital. The possibility to include general provisions in Tier 2, similar to the standardized method, is no longer admitted. [§§§,****]

[***] The Committee left a huge discretion to the member countries in including the above elements in Tier 2 capital. Furthermore, as to loan loss provisions, in the Annex 1 of the 1988 Accord, the Accord stated that the amount of general provisions or general loan-loss reserves must be limited to a maximum of 1.25%, or exceptionally and temporarily up to 2%, of risk assets.

[†††] In other words, "*The conceptual basis for the inclusion of general provisions in capital derives from such reserves being freely available to meet future losses that are currently not identified*". See, for further details, Basel Committee on Banking Supervision (1991).

[‡‡‡] Total regulatory capital is made up of Tier1 capital and Tier2 capital less deductions (examples of deductions are goodwill, increase in equity capital from a securitization exposure, investments in unconsolidated subsidiaries engaged in banking and financial activities). Tier 1 capital is constituted of permanent shareholders' capital (*issued and fully paid ordinary shares/common stock and non-cumulative perpetual preferred stock, but excluding cumulative preferred stock*), and disclosed reserves (*published reserves from post-tax retained earnings*). Tier 2 capital is made up of *undisclosed reserves*, *asset revaluation reserves*, *general provisions*/*general loan-loss reserves*, *hybrid (debt/equity) capital instruments*, and *subordinated debt*. In order to meet the capital requirements for market risk banks may use a third tier capital, which is made up of short-term subordinated debt.

[§§§] In particular, to be more precise, banks must compare the expected credit loss, calculated according to the IRB approach, with the total eligible provisions. If the expected credit loss is higher than the amount of total eligible provisions, banks must deduct the difference (50% of it must be deducted from Tier 1 capital, and 50% from Tier 2 capital). If total provisions exceed the expected loss, the difference can be recognized in Tier 2 capital up to a maximum of 0.6% of credit-risk weighted assets. Finally, provisions set aside against equity exposure under the PD/LGD approach, and any specific provisions against securitization exposure, cannot be included into the eligible provisions.

[****] From a regulatory perspective, loan-loss reserves are not treated the same way everywhere. For example, in Spain reserves are excluded from regulatory capital, while in most of the other countries, as said above, they are included in Tier 2 capital up to the limit of 1.25% of a bank's risk weighted assets (RWAs). In particular, to get a counter-cyclical behavior from domestic banks, as mentioned before, Spanish authorities introduced the so called "*statistical (or dynamic) provision*". According to this regulatory requirement, Spanish banks are forced to some extent to set aside loan-loss provisions during economic expansion, and use them when economy turns down. More in detail, according to the standard model provided by the Banco de

To this study, as to the test for capital and earnings management hypotheses, it is interesting to note that retained earnings are part of Tier 1 capital, while the limit of 1.25% of RWAs implies a restricted role for general loan-loss provisions within Tier 2 capital. Given this set of rules, an increase in loan-loss provisions has conflicting effects on Tier 1 and Tier 2 capital. On the one hand, higher LLPs diminish, via a reduction in retained earnings, Tier 1 capital; on the other, for banks below the just mentioned threshold, an increase in loan-loss provisions cause higher loan-loss reserves and, consequently, raise Tier 2 capital.

In theory, from the perspective of the banking supervisory authorities, loan-loss provisions should be used only to face expected credit losses, but in many countries they are left to the judgment of the bank manager, thus becoming a tool that managers can rely on to pursue various other goals. Even if banks' financial reporting system is highly regulated, managers still hold some discretion, for example, in determining when a loan can be considered impaired. This discretionary power gives them the opportunity to substantially influence a bank's reported net income and capital, sending distorted signals to a bank's stakeholders, hiding the true economic substance of a bank's activity, and the actual value of the company.

España, credit exposures are classified into six groups, each one with a coefficient that gives the level of required statistical provision. Total provisions are the sum of the sum of the requirements for each of the six groups. The maximum amount of statistical provision required for each institution is equal to three times that amount. From a technical standpoint, the statistical provision is a value adjustment: in the published accounts it will be deducted from the book value of the credit items that produce it. Furthermore, another difference relative to the specific and general provisions, dynamic provisions are not included into the regulatory funds. This mechanism, which leaves very little room to managerial discretion, aims at determining a counter-cyclical behavior of the Spanish banks that, as easily inferable, smoothes income over time. For a detailed description of the Spanish provisioning mechanism, see Fernandez de Lis *et al.* (2000).

3. Literature review

This section is comprised of three sub-sections that deals with the incentives bank managers have in using loan-loss provisions as a management tool. In each, we briefly review the main results of the literature, with regard to the three issues addressed in this paper: managers' incentives to use loan-loss provisions to alter bank regulatory capital in order to avoid costs associated with the violation of capital requirements; the earnings management practice via loan-loss provisions, aiming, in particular, at stabilizing bank net profit over time; and, finally, the signaling power of this financial statement item, that is to say the use of loan-loss provisions to provide a signal regarding the earnings that management thinks the bank will be able to obtain in the future.

3.1. Loan-loss provisions and capital management

Capital management via loan-loss provisions hypothesis is based on the idea that bank managers use provisions to avoid the costs associated with the violation of capital adequacy requirements. Within the current regulatory framework, the impact of loan-loss provisions on regulatory capital can be summarized as follows: on the one hand, if provisions increase, Tier 1 capital will reduce because of lower retained earnings; conversely, if general loan-loss reserves are lower than 1.25% of risk-weighted assets, Tier 2 capital will be higher. In the end, the net effect depends on the amount of general loan-loss reserves. Anyway, empirical results on the issue of the use by bank managers of this accounting accrual to manage regulatory capital ratios are not consistent, and are mainly focused on U.S. banks.

Scholes *et al.* (1990) show that banks realize security gains to increase the primary capital ratio when they have low capital ratios, even though that implies a higher amount of taxes to be paid. Moyer (1990) finds evidence that, before Basel I took effect, some bank managers adjusted the discretionary component of loan-loss provisions to manipulate the capital adequacy ratio in order to reduce regulatory costs. Moyer also demonstrates that bank managers exercised discretion over the timing of reported loan-loss provisions to avoid regulatory capital constraints. Beatty *et al.* (1995) contribute to the literature by developing a methodology that takes into account the simultaneity of bank accounting, financing, and operating decisions. They use a simultaneous equations approach to conclude that both loan-loss provisions and loan charge-offs reflect, not only loan quality assessment, but also capital management decisions. In investigating heterogeneity across banks' capital-raising decisions, Collins *et al.* (1995) find a positive influence of capital on loan-loss provisions, which is contrary to the negative relation found by Moyer (1990) and Beatty *et al.* (1995), meaning that when bank capital is low, managers tend to decrease loan-loss provisions rather than increase them. Furthermore, their results show that banks used write-offs more than loan-loss provisions to manage capital ratios. Kim and Kross (1998) investigate whether the introduction of the new capital adequacy regulation impacted on mangers' incentives to use accruals to manage capital ratios. Their results are consistent with the capital management hypothesis: in particular, they find that, after Basel

I came into effect, low-capital banks tended to decrease loan-loss provisions to increase capital ratios, while banks with high capital ratios did not experience any relevant change in their loan-loss provisioning. Similarly, Ahmed *et al.* (1999) find evidence that provisioning decisions are driven not only by changes in the expected quality of loan portfolio, but also by managers' incentives to manage capital adequacy ratios. Finally, Anandarajan *et al.* (2007), analyzing a sample of Australian commercial banks, find some evidence that supports the capital management hypothesis.

3.2. Loan-loss provisions and earnings management

Earnings management[††††] implies the manipulation of reported earnings in such a way that the bottom line of the profit and loss account does not represent the real economic result of a bank's activity. In particular, we are interested in a specific kind of earnings management: income smoothing,[‡‡‡‡] a practice aiming at reducing the variability of net profit over time. In other words, to stabilize net-profit, bank managers will increase (decrease) loan-loss provisions when earnings (before loan-loss provisions) are high (low).

Income smoothing incentives can derive from bank managers' will to adjust bank's current performance to a firm-specific mean, as pointed out by Collins *et al.* (1995), or to the average performance of other benchmark-banks, as highlighted by Kanagaretnam *et al.* (2005). Furthermore, as to the reasons why managers smooth out a bank's income, Bhat (1996) underscores that income smoothing improves the risk perception of a bank to regulators; it helps to stabilize, over time, managers' compensation; it allows managers to grant a steady flow of dividends to bank stockholders; and, it maintains bank stock price stable by reducing earnings volatility.[§§§§]

Literature related to industrial firm financial reporting has extensively investigated the income smoothing rationale. Barnea, Ronen and Sadan (1975) and Ronen and Sadan (1981) point out that firm managers can try to exploit the signaling power of a stable income. Fudenberg and Tirole (1995) focus on managerial self-interest incentives to smooth income: by reducing income volatility, managers would minimize the probability of

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[††††] In their review of the academic evidence on earnings management, Haley and Wahlen (1998) provide the following definition of earnings management: "*Earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about underlying economic performance of the company, or to influence contractual outcomes that depend on reported accounting numbers*".

[‡‡‡‡] Goel and Thakor (2003) distinguish between "real" and "artificial" earnings smoothing. The first one can change firm future cash flows, and impact on the firm value. Examples can be changes in the timing of investments, promotional discounts, etc. The latter is achieved by taking advantage of the flexibility of the financial reporting system, which, to some extent, leaves the managers the discretion to decide the amount of some items of the financial statement.

[§§§§] With regard to some factors displaying a positive impact on managers' will to smooth out income, Bhat (1996) claims that: "*Bank failures, declining earnings, deposit flights to mutual funds, erosion of reserves, hostile takeovers, tightened regulations and pressure from dissident board of directors have significantly increased pressures on banks to smooth their income.*"

being fired. Trueman and Titman (1988) find that income smoothing is a strategy used to reduce the perceived bankruptcy probability of the firm, and, consequently, a firm's borrowing cost. Finally, within an asymmetric information setting, Goel and Thakor (2003) assume that there is some relevant information about the firm that investors cannot get without bearing some informative costs. Depending on whether they choose to pay this cost or not, investors can be regarded as informed or not. If uninformed investors have to sell their shares because of liquidity needs, they get a trading loss when they trade with informed players: this loss being the compensation for the information cost the latter decided to pay to become informed investors. Now, the higher is income volatility, the higher is the value of the private information about the firm, and the higher is the trading loss for uninformed shareholders who sell their shares for, say, liquidity issues. Consequently, investors do not like volatility, and apply a discount to the price of firms with highly-volatile income. Smoothing income is only one of the leverage tools managers employ to avoid the negative influences this mechanism can have on a firm's stock price.[*****]

Moving to the banking literature allows us to add a perspective that industrial firms-related literature cannot assume. In fact, in banking, the issue could also be analyzed from the supervisory authority's point of view. On the one hand, banks are required by regulators to set loan-loss provisions aside against expected credit losses; on the other hand, they have to raise an adequate amount of capital to face unexpected credit losses. To this view, regulators' interest is in reducing bank pro-cyclical behavior: banks should increase loan-loss reserves during good times, and draw resources from these reserves when the economy slows down and potential defaults become real. As a consequence, bank earnings management might also be the result of a manager's attempt to meet capital adequacy requirements.

There is a huge collection of banking literature, mainly U.S.-based, regarding the use of loan-loss provisions for income smoothing. This research provides mixed empirical results: Greenawalt and Sinkey (1988) find that regional banks are more likely to be involved in income smoothing than money-centered banks. In a study examining, among others, the influence of loan-loss provisions as a tool for earnings management, Ma (1988) shows that U.S. commercial banks used loan-loss provisions and charge-offs to smooth reported earnings. Surprisingly, he finds no relationship between loan portfolio quality and loan-loss provisions, in the sense that riskier portfolios did not appear to generate higher LLPs. His results indicate that bank management tends to raise (lower) bank loan-loss provisions in periods of high (low) operating income, thus using LLPs as a pure tool for earnings management. Collins *et al.* (1995) also find a positive relationship between earnings management and LLPs, thus supporting the notion that banks smooth income over

[*****] As to the temporal profile of income smoothing, Goel and Thakor (2003) also underscore that "*what causes smoothing in our analysis is the manager's concern about long-term stock price performance rather than just the current stock price. A "myopic" manager would simply inflate earnings*".

time to a firm-specific mean.[†††††] Bhat (1996) demonstrates that banks are more likely to be involved in income smoothing practices if they are small and in poor financial conditions. More recently, Anandarajan *et al.* (2007) show that Australian commercial banks are engaged in earnings management practices, especially if they are publicly traded.[‡‡‡‡‡]

In contrast, some researches find conflicting evidence: Scheiner (1981), Wetmore and Brick (1994), Beatty *et al.* (1995), and Ahmed *et al.* (1999), among the others, find no evidence of income smoothing. The latter study, in particular, does not find strong evidence of earnings management via LLPs after Basel I came into effect. This is somewhat surprising, as one would expect to evidence more aggressive earnings management since the new capital adequacy regulation removed the constraints associated with earnings management, if compared to the previous regulatory set of rules.

Finally, investigating the cross-country determinants of income smoothing within a sample of banks from different countries, Fonseca and Gonzàlez (2008) find that the incentive to smooth earnings increases in more developed and market-oriented financial systems. Furthermore, according to their results, bank incentives to smooth income are lower in banking systems characterized by higher levels of accounting disclosure and official and/or private supervision, and by stricter restrictions on banking activities.

3.3. Loan-loss provisions as a tool for signaling

Prior research documents a positive relationship between stock returns and loan-loss provisions, suggesting that the market could look at the provisions as a signal of bank managers' private information about future earnings rather than as future loan losses. In particular, Beaver *et al.* (1989) find that, conditional on the reported level of nonperforming loans, higher loan-loss allowances are associated with higher market-to-book ratios. They suggest that loan-loss provisions can indicate that management perceives the earnings power of the bank to be sufficiently strong so that it can withstand a "*hit to earnings in the form of additional loan loss provisions.*"

Back to the distinction between discretionary and non-discretionary provisions, Wahlen (1994) points out that bank managers increase the discretionary component of LLPs when future prospects for cash flows are better. Furthermore, after controlling for unexpected changes in nonperforming loans and unexpected charge-offs, Wahlen finds a positive association between discretionary provisions and both future cash flows and bank

[†††††] Furthermore, based on private discussions with bank managers, Collins *et al.* (1995) claim that strong earnings can reduce the regulatory capital pressure, both directly, by increasing the primary quality capital, and indirectly, by reducing the cost of access to capital markets.

[‡‡‡‡‡] More in particular, Anandarajan *et al.* (2007) claim that pressure to get high and stable returns is higher on listed banks' managers than on not-publicly-traded banks because listed banks are more carefully monitored by regulators. Furthermore, performance based compensation schemes are much more used for listed banks which, finally, have a "*vested interest in reporting stable income numbers due to the fact that they obtain capital by issuing shares*".

stock returns. This evidence suggests the idea that private investors can interpret increases in unexpected loan-loss provisions as good news and not as the anticipated deterioration of credit portfolio's future quality. According to this approach, bank managers would try to convey to investors, the signal that a bank's future earning capacity can easily bear additional loan-loss provisions. Liu and Ryan (1995) demonstrate that loan portfolio composition is predictably associated with the market reaction to and anticipation of LLPs. More specifically, they find that the market reaction to LLPs is positive for banks with a high percentage of large, and frequently renegotiated loans, and that the advance market anticipation of LLPs is stronger for these banks. According to Liu *et al.* (1997), the market interprets higher discretionary loan-loss provisions as good news only if banks appear to experience default risk problems. Beaver and Engel (1996) observe that the valuation coefficients on the "discretionary" and "non-discretionary" components of LLPs are positive and negative, respectively, consistent with the signaling hypothesis. Finally, and in contrast to the aforementioned papers, Ahmed *et al.* (1999) and Anandarajan *et al.* (2007) do not find any evidence of signaling behavior by the banks examined in their studies on U.S. and Australian banks, respectively.

Theory doesn't univocally support the signaling hypothesis. Considering loan-loss provisions a signaling device reminds that, as we learned from the signaling-related literature, the credibility and, consequently, the effectiveness of a signal are based on the nature of its cost. For a signal to be effective, the following two conditions must be fulfilled: the more the signal is used, the higher should be its cost; the cost of a fraudulent use of the signal, meaning the use by "bad players", must be higher than the cost paid by "good players". It is very difficult to disentangle whether loan-loss provisions are costly or not from bank managers' perspective. Provisions can be costly if we think about the decrease in managers' income-based compensation; but, on the other hand, if provisions increase bank capital ratios of a low-capitalized bank, managers can benefit from their rise.

4. Empirical analysis

4.1. The sample selection criteria

Data used in this study are from Thomson's (Bureau van Dijk) Bankscope database, during the period 1996 - 2006. Banks included in the sample have been selected on the basis of the three following selection criteria, aiming at granting homogeneity within the sample in terms of banking activity, and at avoiding double counting of financial institutions.

From a geographical perspective, the worldwide population of banks included in Bankscope is reduced to the sample of institutions belonging to 48 countries, divided into three groups: i) the EU group, made up of 15 countries which were part of the European Union before 2004; ii) the EU/2004 group, i.e. 10 countries which joined the European Union in 2004; iii) and the non-EU group, i.e. 23 countries which, as of December 2006, were not part of the European Union.[§§§§§] We decided to drop Spanish banks from our regression analysis because of the regime of "statistical (or dynamic)" provisions they adopted when the Banco de España introduced it in June 2000. According to this set of rules, statistic provisions should cover the expected losses of the non-impaired portfolio over the cycle to offset the cyclical impact of specific provisions on the profit and loss accounts. So, during the time of good economic conditions, specific provisions are low and statistical provisions increase; during bad times, the growth in specific provisions can be met using the statistical fund instead of the profit and loss account. This mechanism can bias our results, and for this reason we exclude Spanish observations from our investigation.

Furthermore, as previously stated, to avoid financial information duplications, our data are drawn from the consolidated banks' balance-sheets and income-statements, if available, otherwise from the unconsolidated financial statements. Data are drawn from IAS-compliant financial statements, when available, otherwise from financial documents prepared according to the local accounting standards.

[§§§§§] In particular, the "Original EU Countries" group includes: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom. The ten "2004 EU Countries" are: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia. Finally, the "Other European Countries" are: Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia (Republic of), Iceland, Moldova (Republic of), Montenegro, Norway, Russian Federation, Serbia, Switzerland, Ukraine, Turkey, Macedonia, and Romania.

Finally, the third selection criterion is based on the type of banking activity and aims at selecting a sample of banks as homogeneous as possible in their investment activities and financing methods. Therefore, we chose only commercial banks. We exclude central banks, government development banks, and, above all, cooperative and savings banks. Even if we lose a huge number of observations, given the great diffusion of the two last categories in countries like France, Germany, and Italy, we decided to drop them from the sample because, due to the nature of mutual companies they are characterized by, the way they run their business is not comparable to ordinary commercial banks.

The final sample is comprised of 1,041 banks, of which 790 are not publicly traded, and 251 are listed companies. From a geographic perspective, 562 banks belong to the countries which constituted the European Union as of December 1996; 134 banks belong to the 10 countries which joined the EU in May 2004; 345 credit institutions are from the residual group, in which you can find banks from both the three candidate countries (Croatia, Former Yugoslav Republic of Macedonia, and Turkey), and the two countries which entered the EU on 1 January 2007 (Bulgaria and Romania); and the final 466 banks which belong to the Euro Area.

4.2. Method

4.2.1. Testing for capital management and earnings management

To test for capital and earnings management hypotheses, we use the following model:

Equation 4.1:

$$LLP_{i,t} = a_0 + a_1 \Delta NPL_{i,t} + a_2 \Delta LOAN_{i,t} + a_3 EBTP_{i,t} + a_4 T1R_{i,t} + a_5 TA_{i,t} + a_6 GDPGR_{j,t}$$
$$+ a_7 LISTED + a_8 LISTED \bullet T1R_{t,t} + a_9 LISTED \bullet EBTP_{i,t} + \sum \gamma_j C_j + \sum \theta_t Y_t + \varepsilon_{i,t}$$

The variables we have chosen, as predictors, are traditionally used to test for income smoothing and capital management. The dependent variable of our regression model is LLP, the natural logarithm of loan-loss provisions at time *t* for the bank *i*.

Loan-loss provisions are made up of two parts: the first, discretionary or unexpected, is under managers' control; the second, non-discretionary or expected, is related to physiological changes in default risk, due to the ordinary growth of loan portfolio. Detecting whether bank managers use their discretion to manage capital and earnings would be easier if we had the opportunity to separate the discretionary part from the non-discretionary part [Hasan and Wall (2004)]. Prior research used to proxy the non-discretionary component through variables representing the current level and the dynamics of losses within the loan portfolio. Hence, to control for the non-discretionary component, we use:

- (i) $\Delta NPL_{i,t}$, the natural logarithm of the change in nonperforming loans that occurred at the bank *i* at time *t* with respect to time *t-1*. In a loan-loss accounting system, which distinguishes between general and specific provisions, nonperforming loans can be considered a proxy for the specific component. Furthermore, this variable reflects national and local economic conditions [Lobo and Yang (2001)], recording an increase in case of economic downturns. Therefore, loan-loss provisions are expected to be positively related to changes in nonperforming loans;
- (iv) $\Delta LOAN_{i,t}$, the natural logarithm of the change in volumes of lending activity of bank *i* at time *t*, measured by the change in total loan amounts relative to time *t-1*, which can be thought of as a proxy to capture general provisions. As stated by Lobo and Yang (2001), the influence of this variable on loan-loss provisions largely depends on the quality of incremental loans.[******]

Following previous works [Moyer (1990); Beatty *et al.* (1995); Ahmed *et al.* (1999); Anandarajan *et al.* (2007)], we use the ratio of actual higher quality regulatory capital (Tier 1 capital) before loan-loss reserves to the risk-weighted assets to test for the capital management hypothesis. In particular, we consider the natural logarithm of the Tier 1 ratio ($T1R_{i,t}$) of bank *i* at time *t*. Since Tier 2 capital is not taken into account, our model supports capital management hypothesis if the sign of its coefficient is negative, meaning that banks with lower Tier 1 capital ratio will reduce their loan-loss provisions to increase retained earnings and, consequently, the numerator of the regulatory ratio. The existence of a negative relationship between primary quality capital and loan-loss provisions is what the traditional capital management hypothesis states.

Furthermore, we include a dummy variable – LISTED – that equals 1 if the bank is a publicly traded company, and 0 otherwise; we also add the interaction variable between T1R and LISTED – LISTED●T1R – that is used in the regression model to verify whether listed banks are more likely or not to be involved into capital management practices relative to unlisted banking institutions. We expect a negative coefficient because we perceive listed banks as more sensitive to the negative impact that the violation of capital requirements can have for their reputation: in other words, since we expect a negative sign for the coefficient of T1R, we suppose an even more negative relation (coefficient) for LISTED●T1R.

$EBTP_{i,t}$ is the natural logarithm of earnings before taxes and loan-loss provisions of bank *i* at time *t*, and it is the variable we use to test for the income smoothing hypothesis. This hypothesis is supported if its coefficient has a positive sign, meaning that banks with earnings lower (higher) than their target value, tend to reduce (increase) loan-loss

[******] "*Intuitively, the change in the total loans outstanding should have an overall positive impact on the choice of LLPs by bank management. But, as Beaver and Engle (1996) caution, a dramatic increase in relative emphasis on non-performing assets after the mid-80s to achieve a greater long-term stability of the banking system almost certainly prohibited bank managers from lending to less creditworthy borrowers.*" See Lobo and Yang (2001), page 229.

provisions to stabilize them. We include the interaction variable LISTED●EBTP to detect whether publicly traded banks are more likely than unlisted institutions to recur to earnings-stabilizing policy. We expect a positive sign for it because, since they raise funds from the stock market, listed banks should have a greater incentive to manage earnings [Anandarajan *et al.* (2007)].

We also take into account the variable TA, the natural logarithm of total assets, as a measure of bank size, but we do not have a strong *a priori* about the relationship between bank size and loan-loss provisions. Liu and Ryan (1995) and Anandarajan *et al.* (2007) expect the coefficient of this variable to be positive, based on the notion that, due to a larger volume of business, large banks should have higher loan-loss provisions relative to smaller institutions. Even if for a different reason, Watts and Zimmerman's (1986) "political cost" theory implies a positive sign as well.[††††††] On the other hand, thinking about the portfolio diversification opportunities, more likely to be exploited in a larger credit portfolio, the relationship between bank size and the use of loan-loss provisions might be expected to be negative.

The inclusion of annual growth in the gross domestic product (GDPGR) at constant prices, aims at controlling for the pro-cyclical effect of loan-loss provisions, as it is suggested by the risk management hypothesis [Fonseca and Gonzàlez (2008)]. The 11-year time period we use does not allow us to take into consideration an entire economic cycle, hence the results of our analysis should be interpreted with caution.

Finally, we add in the right side of the regression equation, country and time dummies, respectively, to control for different levels of loan-loss provisions across countries, and to capture unobserved time-invariant effect not included in the regression.

[††††††] The political cost hypothesis states that accounting practices able to increase a large firm's reported earnings raise its political visibility and generate effects on company's bookkeeping and regulatory costs. Higher reported earnings can lead to increased taxes and workers' wage claims, can attract "regulators' attention", can justify a reduction in subsidies. Furthermore, Mansfield (1962) also states that higher earnings, and the consequent larger political visibility, can be interpreted as a signal of business opportunities by potential entrants, thus boosting competition deriving from that channel.

4.2.2. Testing for signaling theory

To test the signaling hypothesis, we include the natural logarithm of a one-year-ahead change in earnings before loan-loss provisions and taxes ($\Delta EBTP_{i,t+1}$) into the right side of our regression equation. Furthermore, we make the regression model more parsimonious by dropping ΔNPL and ΔLOAN. Since, the signaling hypothesis states that discretionary changes in loan-loss provisions are positively correlated to future changes in future earnings, we expect a positive sign for the coefficient of the variable, as in Wahlen (1994), Ahmed *et al.* (1999), and in Anandarajan *et al.* (2007). The model we use to test the signaling hypothesis is shown below:

Equation 4.2:

$$LLP_{i,t} = a_0 + a_1 GDPGR_{j,t} + a_2 EBTP_{i,t} + a_3 T1R_{i,t} + a_4 \Delta EBTP_{i,t+1} + a_5 LISTED + a_6 LISTED \bullet \Delta EBTP_{i,t+1} + \sum \gamma_j C_j + \sum \theta_t Y_t + \varepsilon_{i,t}$$

In this model, we add the interaction term between the previously-defined dummy LISTED and $\Delta EBTP_{i,t+1}$ (LISTED●ΔEBTP) to detect whether publicly traded credit institutions behave in a different way relative to unlisted banks in using loan-loss provisions as a signaling tool. As in equation 4.1, we add country and time dummies to control for the different levels of loan-loss provisions across countries, and to capture any unobserved time-invariant effect not included in the regression, respectively.

4.2.3. Descriptive statistics

Table 4.1 provides descriptive statistics for the 1,041 sample banks for the period 1996 – 2006. The mean ratios of loan-loss provisions to total assets (LLPR in Table 4.1) and to average customer loans outstanding (not shown in Table 4.1) are 0.66% and 1.22%, respectively, thus confirming that LLPs are a relatively important accrual for banks. As to the distinction between listed and unlisted institutions, for publicly traded banks, the mean value of the ratio of LLPs to total assets is equal to 0.57%, while it is 0.69% for the unlisted group. Finally, the ratio equals 0.47% for Euro Area banks.

With respect to the credit quality of our sample banks, nonperforming loans are, on average, 4.74% of customer loans. Furthermore, the credit quality of listed banks is, as expected, better than unlisted banks: nonperforming loans are 3.11% of customer loans for the listed group versus a figure of 5.39% for the unlisted one; they are 2.6% for Euro Area banks.

The third indicator (LLA) is the ratio of loan-loss allowances to total assets: it is the amount of provisions built by banks in the past to face risks generically related to banking business. It equals 3.12% for all the sample banks, 2.49% for listed banks, and 3.43% for unlisted banks, which are likely to behave in a less prudent way if compared to listed banks. Euro Area credit institutions record an even lower value: 1.71%. This last piece of evidence is consistent with the previous one: listed banks do have lower nonperforming loan ratios than unlisted institutions, and, at the same time, are characterized by lower levels of loan-loss allowances. This might be evidence of better risk management practices at listed banks, which enables them to keep down the amount of nonperforming loans. Furthermore, to some extent, it also might be the result of market discipline, which forces publicly traded banks to be particularly sensible to related-to-credit quality issues. Better risk management allows listed banks to optimize capital management, thus reducing the so called regulatory-tax: looking at the Tier 1 capital ratio for publicly traded institutions, primary quality capital is 12.68% of the risk weighted assets, which is, on the one hand, far above the regulatory minimum, and, conversely, lower than both the unlisted banks value (16.61%).

On average, loans are far more than half the entire sample banks' total assets (65.03%), where listed banks show a ratio that is lower than the unlisted ones (56.01% and 68.67%, respectively): this is what we expect to see because unlisted banks can be thought of as more involved in traditional banking activity (customer loans). The ratio stands at 51.58% for Euro Area banks.

Banks' capital endowment is measured by two indicators: first, the Tier 1 capital ratio, the ratio of primary quality capital to risk weighted assets, whose mean value is 15.48%, by far higher than the minimum required by the Basel Accord (4%); second, the ratio of the book value of equity to total assets, whose mean value is 10.64% for the entire sample of banks, 9.59% for the listed institutions, 11.07% for the unlisted intermediaries, and 8.10% for Euro Area banks, respectively. Both of the capital endowment ratios suggest that our sample banks are very well capitalized.

Finally, ROA (return on assets) for the sample is 0.96%, slightly below the figures observed by other studies, though they were focused on the American banking market. It equals 1.06% for listed credit institutions, 0.92% for the unlisted group and 0.55% for the banks of the Euro Area.

Table 4.1: Descriptive statistics for the sample of 1,041 commercial banks over 1996-2006.

VARIABLE	All Banks Mean (SD)	Listed Banks Mean (SD)	Unlisted Banks Mean (SD)	Euro Area Banks Mean (SD)
LLPR	0.0066 (0.0360)	0.0057 (0.0140)	0.0069 (0.0417)	0.0047 (0.0457)
NPLR*	4.7362 (9.5722)	3.1076 (8.0108)	5.3922 (10.0604)	2.6046 (6.8415)
LLA	0.0312 (0.1327)	0.0249 (0.0259)	0.0343 (0.1607)	0.0171 (0.0174)
LOANR	0.6503 (3.5190)	0.5601 (0.1676)	0.6867 (4.1661)	0.5158 (0.3409)
T1R*	15.48 (10.29)	12.68 (6.75)	16.61 (11.21)	13.47 (9.83)
EBTPR	0.0544 (0.0494)	0.0542 (0.0352)	0.0545 (0.0541)	0.0350 (0.0255)
BVETOTA*	10.64 (7.79)	9.59 (5.32)	11.07 (8.55)	8.10 (6.91)
ROA	0.0096 (0.0283)	0.0106 (0.0187)	0.0092 (0.0314)	0.0055 (0.0221)

Note: The quantities in parentheses below the estimates are the standard errors.
* Figures are expressed in percentage points.

LLPR	Loan loss provisions/Total Asset
NPLR	Non performing loans/Total Asset
LLAR	Loan- loss allowances/Total Asset
LOANR	Total customer loans/Total Asset
T1R	Total capital ratio/Minimum required capital ratio
EBTPR	Earnings before taxes and loan loss provisions/Total Asset
BVETOTA	Book value of equity/Total Asset
ROA	Return On Assets

Tables 4.2 and 4.3 provide pairwise correlation coefficients of the variables we use in our regression models for both listed and unlisted banks. As to the first group of intermediaries, among the independent variables, the natural logarithm of the change in nonperforming loans (ΔNPL), the natural logarithm of the change in total customer loans, the natural logarithm of earnings before taxes and loan-loss provisions (EBTP), and the natural logarithm of total assets (TA), are positively and significantly associated with the natural logarithm of loan-loss provisions (LLP). The natural logarithm of Tier 1 capital ratio (T1R), the GDP growth rate, and the natural logarithm of the change in total customer loans (ΔLOAN) are positively, but not significantly, associated with loan-loss provisions.

Even if the relation will be further investigated through the econometric analysis, with regard to the GDP growth rate correlation coefficient, the insignificance we find is not

consistent with Anandarajan *et al.*'s (2007) paper, where authors highlight a positive and significant correlation coefficient, suggesting that the relation between loan-loss provisions and GDP growth rate might work as follows: when the economy is in good shape, firms tend to borrow more money; consequently, banks have to set aside a larger amount of loan-loss provisions to "*take bad debt into consideration.*" Neither is our piece of evidence consistent with Fonseca and Gonzàlez (2008), Laeven and Majnoni (2003), and Bikker and Metzemakers (2005): these studies use international samples of banks, and find that loan-loss provisions and GDP growth are negatively related. As previously stated, EBTP, the natural logarithm of earnings before taxes and loan-loss provisions, is positively and significantly associated with LLP, entailing that loan-loss provisions move with income: this is consistent with Fonseca and Gonzàlez (2008), but not consistent with Anandarajan *et al.*'s (2007) paper.

As to unlisted banks, among the independent variables, the natural logarithm of the change in nonperforming loans (ΔNPL), the natural logarithm of the change in total customer loans (ΔLOAN), the natural logarithm of earnings before taxes and loan-loss provisions (EBTP), and the natural logarithm of total assets (TA) are positively and significantly associated with the natural logarithm of loan-loss provisions. With regard to TA, the relation we find is consistent with what Anandarajan et al.'s (2007) paper points out. On the contrary, the natural logarithm of Tier 1 capital ratio and the GDP growth rate are negatively and significantly associated with LLP.

Table 4.2: Pairwise correlation coefficients of key variables of the sample listed commercial bank observations

	LLP	ΔNPL	ΔLOAN	T1R	EBTP	GDPGR	TA
LLP	1						
ΔNPL	0.8455***	1					
ΔLOAN	08929***	0.8153***	1				
T1R	0.0243	0.0317	- 0.0548	1			
EBTP	0.9495***	0.8439***	0.9484***	0.0075	1		
GDPGR	0.0474	0.0606	0.1638***	0.1828***	0.1028***	1	
TA	0.9361***	0.8411***	0.9568***	- 0.0792***	0.9874***	0.0526*	1

Note: ***, **, * = significance level of 1%, 5%, and 10%, respectively

LLP	Natural logarithm of loan loss provisions
ΔNPL	Natural logarithm of the change in non performing loans
ΔLOAN	Natural logarithm of the change in total customer loans
T1R	Natural logarithm of Tier 1 capital ratio
EBTP	Natural logarithm of earnings before taxes and loan loss provisions
GDPGR	GDP growth rate
TA	Natural logarithm of total assets

Table 4.3 Pairwise correlation coefficients of key variables of the sample unlisted commercial bank observations

	LLP	ΔNPL	ΔLOAN	T1R	EBTP	GDPGR	TA
LLP	1						
ΔNPL	0.7759***	1					
ΔLOAN	0.8404***	0.7726***	1				
T1R	- 0.1187***	- 0.2214***	- 0.2739***	1			
EBTP	0.8838***	0.7545***	0.8974***	- 0.2124***	1		
GDPGR	- 0.0582**	- 0.0267	- 0.0631***	0.1358***	- 0.0616***	1	
TA	0.8370***	0.7373***	0.9058***	- 0.2725***	0.9480***	- 0.1699***	1

Note: ***, **, * = significance level of 1%, 5%, and 10%, respectively

LLP	Natural logarithm of loan loss provisions
ΔNPL	Natural logarithm of the change in non performing loans
ΔLOAN	Natural logarithm of the change in total customer loans
T1R	Natural logarithm of Tier 1 capital ratio
EBTP	Natural logarithm of earnings before taxes and loan loss provisions
GDPGR	GDP growth rate
TA	Natural logarithm of total assets

5. Results

The empirical analysis aims at detecting whether European banks in our comprehensive sample behave differently in the use of loan-loss provisions as a tool for regulatory capital management, for income smoothing, and as a signal to the market, according to the hypotheses previously described. In the following paragraphs, we develop a comparison between EU banks and non-EU banks for both capital and earnings management hypotheses, and signaling hypothesis.

5.1. Capital management and earnings management: EU banks versus non-EU banks

The basic equation for the multi-country comparison is based on equation (4.1), which is estimated separately for EU banks and non-EU banks. To determine whether the observed differences between the two sets of coefficients, one for each of the two groups of countries, are significant, the following equation is estimated for the pooled sample:

Equation 5.1

$$
\begin{aligned}
LLP_{i,t} &= a_0 + a_1 \Delta NPL_{i,t} + a_2 \Delta LOAN_{i,t} + a_3 EBTP_{i,t} + a_4 T1R_{i,t} \\
&+ a_5 TA_{i,t} + a_6 GDPGR_{j,t} + a_7 LISTED + a_8 LISTED \bullet T1R_{t,t} + a_9 LISTED \bullet EBTP_{i,t} \\
&+ \sum \gamma_j C_j + \sum \theta_t Y_t + \beta_1 EU + \beta_2 EU \bullet \Delta NPL_{i,t} + \beta_3 EU \bullet \Delta LOAN_{i,t} + \beta_4 EU \bullet EBTP_{i,t} \\
&+ \beta_5 EU \bullet T1R + \beta_6 EU \bullet TA + \beta_7 EU \bullet GDPGR_{j,t} + \beta_8 EU \bullet LISTED + \\
&\beta_9 EU \bullet LISTED \bullet T1R_{i,t} + \beta_{10} EU \bullet LISTED \bullet EBTP_{i,t} + EU \bullet \sum \gamma\gamma_j C_j + EU \bullet \sum \theta\theta_t Y_t + \varepsilon_{i,t}
\end{aligned}
$$

The β coefficients represent the differences between the coefficients from the two samples. The statistical significance of these coefficients may be used to confirm, or not, that statistical differences do exist. EU is a sample binary variable, equal to 1 if bank *i* is from one of the European Union countries, 0 otherwise.

In regressions number 5, 10 and 15 of Table 5.1 we show the results of the model for the sample of EU banks, non-EU credit institutions, and for the combined sample of "EU + non-EU" intermediaries, respectively. In the remaining regression models, each of the explanatory variable – ΔNPL, ΔLOAN, T1R, and EBTP – is taken together with the GDP growth rate. However, the following comments are referred in particular to regressions 5, 10 and 15 in Table 5.1.

The GPD growth rate is negatively associated with the natural logarithm of loan-loss provisions for both EU and non-EU banks, but it is significant at 5% level only for the latter group. In particular, as to non-EU banks, the semi-elasticity of LLPs with respect to GDP growth rate is equal to -0.0412: a 1 percentage point increase in the GDP growth rate decreases loan loss provisions by circa 4%. This evidence is consistent with bank pro-cyclical behavior, already pointed out in previous empirical evidence such as Fonseca and González (2008), Bikker and Metzemakers (2005), and Laeven and Majnoni (2003).

Elasticity of loan-loss provisions, with respect to the change in nonperforming loans, has a positive sign, as expected: a 1% raise in bank nonperforming loans increases loan-loss provisions by about 0.08% for EU banks, and by 0.11% for non-EU banks. The estimated elasticity of LLPs, with respect to the change in the amount of customer loans, is negative and significant for EU banks, whereas it is positive, but not significant for non-EU banks, showing a very low economic significance. A 1% increase in bank total customer loans pushes down loan-loss provisions by 0.14% at EU credit institutions, thus confirming the prudent behavior by bank managers supported by Beaver and Engle (1996) in their paper on a sample of large U.S. banks.

The estimated elasticity of LLPs, with respect to Tier 1 capital ratios, is negative and statistically significant at EU banks, as stated by the regulatory capital management hypothesis: a 1% increase in primary quality capital decreases loan-loss provisions by 0.3%. With regard to non-EU banks, the coefficient has a positive sign and is marginally significant (10% level): a 1% increase in Tier 1 capital ratio increases loan-loss provisions by 0.2%. It is less positive for listed banks since the interaction term – LISTED•T1R – is negative and statistically significant at the 1% level.

Elasticity of LLPs, with respect to earnings before taxes and loan-loss provisions, is positive and significant at 1% level, for both EU banks and non-EU banks, thus supporting the income smoothing hypothesis: a 1% increase in earnings before taxes and provisions increases loan-loss provisions by 0.67% at EU banks, and by approximately 0.78% at non-EU credit institutions, respectively. The interaction term LISTED•EBTP is never statistically significant.

Bank size, measured in terms of (the natural logarithm of) total assets, has a positive and significant coefficient (at the 5% level) at EU banks: a 1% increase in total assets determines a 0.20% raise in loan-loss provisions. This result supports both the idea that large credit institutions may have higher levels of risk to face, and Watts and Zimmerman's "political cost" theory, according to which large firms would reduce their earnings, via LLPs increases, to avoid larger political visibility. Bank size is neither statistically nor economically significant for non-EU group.

The dummy LISTED has a positive but not significant coefficient for EU credit institutions, but it is positive and marginally significant (10% level) for non-EU countries,

entailing that on average LLPs are higher for listed than for unlisted commercial banks at non-EU banks.

The last column in Table 5.1, regression 15, presents the results of the estimation on the pooled sample to detect whether the differences between the coefficient estimates are statistically significant, that is to say whether we find differences between EU banks and non-EU credit institutions. None of the differences between the coefficient estimates between EU and non-EU banks is significant, with the exception of the change in customer loans (EU●LOAN), and the Tier 1 capital ratio (EU●T1R). Not only is the difference in coefficients on LOAN significant, the coefficient is not significantly different from zero for the non-EU sample, whereas it is positive and significant for the EU banks. This result suggests that most of the provisions set aside by EU banks are linked to changes in nonperforming assets, that is to say, they are specific provisions. In other words, EU banks do not consider unidentified problems when making decisions regarding provisioning. The difference between the coefficients on EU banks' Tier 1 capital ratio and the coefficient for the non-EU banks is significantly negative. This means that EU banks are much more involved in capital management practices than are non-EU credit institutions.

Table 5.1: Determining factors of Loan-Loss Provisions, EU versus non-EU banks

LLP is the natural logarithm of loan-loss provisions; GDPGR is the GDP growth rate; ΔNPL is the natural logarithm of the change in non performing loans; ΔLOAN is the natural logarithm of the change in total customer loans; T1R is the natural logarithm of Tier 1 capital ratio; EBTP is the natural logarithm of earnings before taxes and loan-loss provisions; TA is the natural logarithm of total assets; LISTED is a dummy variable that takes the value 1 for listed banks and 0 for unlisted banks; EU is a dummy variable that takes the value 1 for banks from EU countries, 0 otherwise.

	DEPENDENT VARIABLE – LLP														
	EU BANKS					NON-EU BANKS					EU + NON-EU BANKS				
VARIABLE	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12	Reg. 13	Reg. 14	Reg. 15
Intercept	0.8842	-1.4260***	6.8927***	-2.0836***	-1.0697	-0.4906	-1.0249	1.8241	-0.574	-1.8032*	0.9734	-0.4903	1.597	0.0481	-1.8018*
GDPGR	-0.2014**	-0.1539***	-0.1388**	0.0167	-0.0363	-0.0789***	-0.0597***	-0.0849***	-0.0436***	-0.0412**	-0.0772***	-0.0516**	-0.0980***	-0.0414***	-0.0403**
ΔNPL	0.4359***	-	-	-	0.0761***	0.3164***	-	-	-	0.1109***	0.3200***	-	-	-	0.1093***
ΔLOAN	-	0.6258***	-	-	-0.1451***	-	0.5598***		-	0.0039	-	0.5627***	-	-	0.0265
T1R	-	-	-1.3153***	-	-0.2978**	-	-	-0.3042***	-	0.2035*	-	-	-0.2773**	-	0.2141*
EBTP	-	-	-	0.8125***	0.6715***	-	-	-	0.8192***	0.7851***	-	-	-	0.8308***	0.7477***
TA	-	-	-	-	0.2022**	-	-	-	-	0.005	-	-	-	-	0.045
LISTED	-	-	-	-	0.511	-	-	-	-	1.1385*	-	-	-	-	1.1561
LISTED●T1R	-	-	-	-	-0.438	-	-	-	-	-0.4391*	-	-	-	-	-0.4434
LISTED●EBTP	-	-	-	-	0.0978	-	-	-	-	0.015	-	-	-	-	0.0161
EU	-	-	-	-	-	-	-	-	-	-	1.5774	-0.1802	5.3826***	-0.9560*	-0.8974
EU●ΔNPL	-	-	-	-	-	-	-	-	-	-	0.1082***	-	-	-	-0.035
EU●ΔLOAN	-	-	-	-	-	-	-	-	-	-	-	0.0627*	-	-	-0.1850***
EU●T1R	-	-	-	-	-	-	-	-	-	-	-	-	-1.0520***	-	-0.5182***
EU●EBTP	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.0302	-0.0765
EU●GDPGR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1566
EU●TA	-	-	-	-	-	-	-	-	-	-	-0.0926	-0.037	-0.0324	0.0234	0.0122
EU●LISTED	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.7449
EU●LISTED●T1R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.036
EU●LISTED●EBTP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0835
Adjusted R^2	0.4858	0.6041	0.3385	0.7267	0.7660	0.8632	0.8600	0.7877	0.9022	0.9318	0.7357	0.7755	0.6264	0.8384	0.8766
F-statistics	26.75***	62.17***	31.35***	158.54***	61.51***	110.10***	157.26***	121.01***	298.58***	176.94***	73.06***	132.49***	91.23***	279.65***	126.54***
Number of observations	655	963	1,500	1,500	574	485	713	939	936	452	1,100	1,700	2,400	2,400	1,026

Note: ***, **, * = significance level of 1%, 5%, and 10%, respectively

5.2. Loan loss provisions as a signaling tool: EU banks versus non-EU banks

The basic equation for the multi-country comparison is based on equation (4.2), which is estimated separately for EU banks and non-EU banks. As done before for capital and earnings management hypotheses, in order to detect whether the observed differences between the two sets of coefficients are significant, the following equation is estimated for the pooled sample:

Equation 5.2

$$
\begin{aligned}
&LLP_{i,t} = a_0 + a_1 GDPGR_{j,t} + a_2 EBTP_{i,t} + a_3 T1R_{i,t} + a_4 \Delta EBTP_{i,t+1} \\
&+ a_5 LISTED + a_6 LISTED \bullet \Delta EBTP_{i,t+1} + \sum \gamma_j C_j + \sum \theta_t Y_t + \beta_1 EU + \beta_2 EU \bullet GDPGR_{j,t} \\
&+ \beta_3 EU \bullet EBTP_{i,t} + \beta_4 EU \bullet T1R_{i,t} + \beta_5 EU \bullet \Delta EBTP_{i,t+1} + \beta_6 EU \bullet LISTED \\
&+ \beta_7 EU \bullet LISTED \bullet \Delta EBTP_{i,t+1} + \sum \gamma\gamma_j C_j + \sum \theta\theta_t Y_t + \varepsilon_{i,t}
\end{aligned}
$$

The β coefficients represent the differences between the coefficients from the two samples, and the statistical significance of these coefficients may be used to support, or not, statistical differences. EU is a sample binary variable, equal to 1 if bank *i* is from one of the European Union countries, 0 otherwise.

In Table 5.2 we report the results of our estimations. We focus on the regressions number 4, 8 and 12; in the other columns, we show the results of the regressions we obtain by separately incorporating EBTP, T1R, and $\Delta EBTP_{t+1}$ into the model: each of them is taken together with GDPGR. In order for the signaling theory to be supported, we expect to find a positive sign for the $\Delta EBTP_{t+1}$ coefficient, as stated also in Wahlen (1994) and Anadarajan *et al.* (2007). With regard to EU banks, in regression number 4 in Table 5.2, we do not find evidence of the use of loan-loss provisions as a signal to the market of a bank's future profits: the coefficient is neither positive nor significant. Conversely, in regression number 8, it is positive and significant at the 1% level for non-EU banks: an increase in LLPs, at time *t,* is associated with higher one-year-ahead reported earnings. Not only is the difference in coefficients on $\Delta EBTP_{t+1}$ significant, as we can see in regression number 12: since the coefficient on $\Delta EBTP_{t+1}$ is not significantly different from zero for EU banks, the analysis suggests that EU credit institutions do not rely on this kind of signal to transmit to the market their expectations about future performances. Hence, we can conclude that loan-loss provisions do not appear to be used as a signaling device within the EU group of countries. Anyway, this finding might be due to the fact that loan-loss provisions are seen as an expense rather than as a form of future profitability.

Tabella 5.2: Test of Signaling Theory: EU versus non-EU banks

LLP is the natural logarithm of loan-loss provisions; GDPGR is the GDP growth rate; EBTP is the natural logarithm of earnings before taxes and loan-loss provisions; T1R is the natural logarithm of Tier 1 capital ratio; $\Delta EBTP_{t+1}$ is the one-year-ahead change in earnings before loan-loss provisions and taxes; LISTED is a dummy variable that takes the value 1 for listed banks and 0 for unlisted banks; EU is a dummy variable that takes the value 1 for banks from EU countries, 0 otherwise.

	DEPENDENT VARIABLE – LLP											
	EU BANKS				NON-EU BANKS				EU + NON-EU BANKS			
VARIABLE	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12
Intercept	-2.0836***	6.8927***	0.3193	-1.4866**	-0.574	1.8241	1.5208	0.6754	0.0481	1.597	0.9743	-0.7378
GDPGR	0.0167	-0.1388**	-0.0098	0.0781	-0.0436***	-0.0849***	-0.0482**	-0.0602***	-0.0414***	-0.0980***	-0.0796***	-0.0636***
EBTP	0.8125***	-	-	0.8197***	0.8192***	-	-	0.6338***	0.8308***	-	-	0.6383***
T1R	-	-1.3153***	-	-0.0094	-	-0.3042***	-	0.1481	-	-0.2773**	-	0.1449
$\Delta EBTP_{t+1}$	-	-	0.6836***	-0.0104	-	-	0.6154***	0.1932***	-	-	0.6046***	0.2075***
LISTED	-	-	-	1.5271**	-	-	-	0.0786	-	-	-	0.138
LISTED●EBTP	-	-	-	0.0421	-	-	-	0.1670*	-	-	-	0.1634*
LISTED●T1R	-	-	-	-0.6708***	-	-	-	-0.2063	-	-	-	-0.2211
LISTED●$\Delta EBTP_{t+1}$	-	-	-	-0.0275	-	-	-	-0.1202	-	-	-	-0.1234
EU	-	-	-	-	-	-	-	-	-0.9560*	5.3826***	-0.185	0.0000
EU●GDPGR	-	-	-	-	-	-	-	-	0.0234	-0.0324	0.0813	0.0836**
EU●EBTP	-	-	-	-	-	-	-	-	-0.0302	-	-	0.1700**
EU●T1R	-	-	-	-	-	-	-	-	-	-1.0520***	-	-0.1512
EU●$\Delta EBTP_{t+1}$	-	-	-	-	-	-	-	-	-	-	0.0798*	-0.2148***
EU●LISTED	-	-	-	-	-	-	-	-	-	-	-	1.4267
EU●LISTED●T1R	-	-	-	-	-	-	-	-	-	-	-	-0.4762
EU●LISTED●EBTP	-	-	-	-	-	-	-	-	-	-	-	0.0926
EU●LISTED●$\Delta EBTP_{t+1}$	-	-	-	-	-	-	-	-	-	-	-	-0.1224
Adjusted R^2	0.7267	0.3385	0.5916	0.738	0.9022	0.7877	0.8752	0.9066	0.8384	0.6264	0.7707	0.8441
F-statistics	158.54***	31.35***	48.69***	74.99***	298.58***	121.01***	135.78***	153.97***	279.65***	91.23***	102.54***	129.06***
Number of observations	1,500	1,500	791	789	936	939	539	537	2,400	2,400	1,300	1,300

Note: ***, **, * = significance level of 1%, 5%, and 10%, respectively

6. Robustness Test

In this section we examine three potential problems: the association between loan-loss provisions and Tier 2 capital, panel data bias and survivorship bias. The details of the tests for panel data bias and survivorship bias are not shown in the paper.

6.1 Test of the impact of Tier II capital in the association between loan-loss provisions and capital management

Tier 2 capital includes undisclosed reserves, asset revaluation reserves, general provisions/general loan-loss reserves, hybrid (debt/equity) capital instruments, and subordinated debt. As previously mentioned, loan-loss reserves are limited to a maximum of 1.25% of risk-weighted assets. Total capital is the sum of Tier 2 capital and Tier 1 capital, as defined in footnote 10. The objective of this paragraph is to investigate whether the relation between LLP and the independent variables of our model changes if we test the capital management hypothesis by using Tier 2 capital ratio and Total capital ratio instead of Tier 1 capital ratio.

Consequently, we re-run regressions 5, 10 and 15 of Table 5.1, and compare their results with those we find by replacing Tier 1 capital ratio with Tier 2 capital ratio and Total capital ratio, respectively. Our estimations are presented in Table 6.1, where, for the sake of comparison, we repeat our earlier results as well: MCAP is the natural logarithm of Tier 1 capital ratio (the previous T1R) in columns 1, 4 and 7; it is the natural logarithm of Tier 2 capital ratio (T2R) in columns 2, 5, and 8; and, finally, it is the natural logarithm of Total capital ratio in columns 3, 6, and 9.

Evidence shown in the table suggests that the limitation of loan-loss reserves to 1.25% of risk-weighted assets doesn't alter the results we previously discussed. In fact, coefficients on MCAP are negative and statistically significant for EU banks, regardless the definition of regulatory capital we use (regressions 1, 2, and 3); their sign is positive and marginally significant at non-EU banks (regressions 4, 5, and 6), and, finally, for the combined sample (regressions 7, 8, and 9). What's more, results from regressions 3, 6, and 9, where the Total capital ratio is used as explanatory variable, can be interpreted as a proof of the limited amount of Tier 2 capital.

Table 6.1: Determining factors of Loan-Loss Provisions with different definitions of regulatory capital, EU versus non-EU banks
LLP is the natural logarithm of loan-loss provisions; GDPGR is the GDP growth rate; ΔNPL is the natural logarithm of the change in non performing loans; ΔLOAN is the natural logarithm of the change in total customer loans; MCAP is the natural logarithm of actual regulatory capital ratio; EBTP is the natural logarithm of earnings before taxes and loan-loss provisions; TA is the natural logarithm of total assets; LISTED is a dummy variable that takes the value 1 for listed banks and 0 for unlisted banks; EU is a dummy variable that takes the value 1 for banks from EU countries, 0 otherwise.

	DEPENDENT VARIABLE – LLP								
	EU BANKS			NON-EU BANKS			EU + NON-EU BANKS		
VARIABLE	Reg. 1 Tier 1 ratio	Reg. 2 Tier 2 ratio	Reg. 3 Total capital ratio	Reg. 4 Tier 1 ratio	Reg. 5 Tier 2 ratio	Reg. 6 Total capital ratio	Reg. 7 Tier 1 ratio	Reg. 8 Tier 2 ratio	Reg. 9 Total capital ratio
Intercept	-1.0697	-1.8195***	-1.1987	-1.8032*	-2.1619***	-2.5973***	-1.8018*	-3.3134***	-2.6724***
GDPGR	-0.0363	-0.0309	-0.0308	-0.0412**	-0.0443**	-0.0444**	-0.0403**	-0.0401**	-0.0402**
NPL	0.0761***	0.0762***	0.0763***	0.1109***	0.1063***	0.1062***	0.1093***	0.1047***	0.1046***
LOAN	-0.1451***	-0.1397***	-0.1399***	0.0039	0.0061	0.0059	0.0265	0.0267	0.0265
MCAP	-0.2978**	-0.3249**	-0.3095**	0.2035*	0.2300*	0.2185*	0.2141*	0.2316*	0.2210*
EBTP	0.6715***	0.6422***	0.6423***	0.7851***	0.7910***	0.7918***	0.7477***	0.7521***	0.7530***
TA	0.2022**	0.2309**	0.2306**	0.005	0.0029	0.0023	0.045	0.0456	0.0449
LISTED	0.511	-0.5333	-0.276	1.1385*	0.3507	1.3097	1.1561	0.3423	1.2792
LISTED●MCAP	-0.438	-0.157	-0.134	-0.4391*	-0.4751	-0.4718*	-0.4434	-0.4632	-0.4606
LISTED●EBTP	0.0978	0.1216**	0.1222**	0.015	0.0116	0.0117	0.0161	0.0135	0.0136
EU	-	-	-	-	-	-	-0.8974	0.0000	0.0000
EU●NPL	-	-	-	-	-	-	-0.035	-0.0299	-0.0298
EU●LOAN	-	-	-	-	-	-	-0.1850***	-0.1801***	-0.1800***
EU●MCAP	-	-	-	-	-	-	-0.5182***	-0.5661***	-0.5398***
EU●EBTP	-	-	-	-	-	-	-0.0765	-0.108	-0.1088
EU●TA	-	-	-	-	-	-	0.1566	0.1829	0.1835
EU●GDPGR	-	-	-	-	-	-	0.0122	0.0194	0.0193
EU●LISTED	-	-	-	-	-	-	-0.7449	-0.8793	-1.539
EU●LISTED●MCAP	-	-	-	-	-	-	0.036	0.2961	0.3166
EU●LISTED●EBTP	-	-	-	-	-	-	0.0835	0.1055	0.1060*
Adjusted R^2	0.9322	0.762	0.7621	0.766	0.8767	0.9322	0.8766	0.9318	0.8768
F-statistics	176.92***	57.72***	57.73***	61.51***	123.37***	176.99***	126.54***	176.94***	123.41***
Number of observations	449	550	550	574	999	449	1,026	452	999

Note: ***, **, * = significance level of 1%, 5%, and 10%, respectively

6.2 Panel data bias and survivorship bias

Our dataset is a pooled cross-sectional and time series data. Consequently, the t-statistics could be overstated. That's why we conducted a panel data analysis using a fixed effect model. The results (not shown) are robust and consistent with results reported earlier. A final issue is related to survivorship bias. None of the banks in our sample filed for bankruptcy during the sample period. Cases of mergers and acquisitions during the period were omitted from the analysis discussed above. Anyway, their inclusion doesn't alter our results: we created a dummy variable taking on the value of 1 if the bank engaged in M&As activity, and 0 otherwise. Altough this doesn't remove survivorship bias, we can conclude that it doesn't influence our results.

7. Cross-country determinants of income smoothing

In this section, we aim at analyzing whether some country-specific characteristics of the banking systems, such as bank regulation and bank supervision, take part in income smoothing decisions by bank managers. There is a relative paucity of research in banking, whereas this issue has been more extensively addressed for industrial and commercial firms.

7.1. Prior literature and hypotheses development

Prior literature investigated the impact of some cross-country determinants on income smoothing via loan-loss provisions. With regard to industrial and commercial firms, Leuz et al. (2003) find that the weakness of investor protection can boost income smoothing, due to the fact that, in these conditions, insiders can take advantage of private-control benefits and have greater incentives to hide bank performances.

On the banking side, deposit insurance systems might be the reason for some risk-oriented behavior by banks. Nevertheless, previous literature has also shown that this negative effect can be off-set by a sound legal system with a proper enforcement of rules [Demirgüc-Kunt and Detragiache (2002)]. Furthermore, Fonseca and Gonzàlez (2008) show that a higher level of protection for creditors' rights against borrower expropriation reduce bank incentives to smooth earnings by reducing bank risk in lending activities. A negative relation between the rights of the minority shareholders and bank earnings management is highlighted by Shein and Chich (2005), who do not find a negative influence for the quality of legal enforcement.

With regard to the accounting system banks use, Fonseca and Gonzàlez (2008) find support to the hypothesis that the stricter the accounting disclosure requirements are, the more reliable the financial reports are. In other words, a higher accounting disclosure provides a stimulus to reduce incentives to smooth earnings. Authors suggest that a system with a lower degree of accounting disclosure should be characterized by less informed bank

lenders, and, consequently, by huger asymmetric information-related issues, and higher bank risk, that would generate more incentives to smooth earnings.

Following Fonseca and Gonzàlez (2008), in this paragraph we aim at detecting the impact of some other cross-country determinants on income smoothing practice at our sample banks. The variables we take into account are bank regulation and bank supervision, this latter both as supervisory activity exerted by official authorities and as a sort of private control exerted by private forces, including the market.

Banking system regulation and supervision may have an impact on credit institutions' decisions to smooth their income. As to the former, it can have either a positive or a negative effect: on the one hand, a stricter bank regulation may reduce incentives for income smoothing by reducing competition and risk taking behavior by banks; on the other hand, more regulated banks might be driven to use loan-loss provisions to smooth their earnings relative to less regulated institutions since opportunities for using other tools have been reduced by bank law. We measure the level of bank regulation through the indicator of regulatory restrictions on non-traditional bank activities developed by Barth et al. (2001): it measures the extent to which banks are allowed to engage in securities, insurance, and real estate activities, and to own non-financial firms. We define this variable BANK because it is a sort of definition of what a bank is, through the definition of what a bank is allowed to do, within the different banking systems we examine. BANK ranges from 4 to 16, where the lower values entail: i) lower degree of restrictions on the activities a bank can be involved in; and ii) more relaxed limits on the ownership of non financial firms by banks.

The degree to which supervisory authorities may intervene is crucial to assure the soundness of the banking system. Barth et al. (2001) developed two indicators concerning both the official supervisory power, that is to say the possibility that supervisory authorities take actions to prevent and correct problems within the banking industry, and private monitoring, that is to say monitoring activity exerted by market forces.

What's more, as to the former, the variable measuring the official supervisory power (OSP) captures the extent to which supervisory authorities can take prompt, corrective action, restructure and reorganize a troubled bank or declare it insolvent. OSP is based on "yes or no" responses to some questions related, for example, to:

- whether supervisory authorities can force a bank to change its internal organizational structure, or order a bank's directors/managers to provide provisions to cover actual or potential losses, or to suspend the directors' decisions to distribute dividends, bonuses, and management fees,
- whether there are mechanisms of cease and desist type orders, whose infraction leads to the automatic imposition of civil and penal sanctions on the banks directors and managers;
- whether supervisory authorities can suspend some or all ownership rights of a problem bank;

- whether, in case of bank restructuring or reorganization, supervisory agency or any other government agency can supersede shareholder rights, remove or replace management/directors.

OSP ranges from 0 to 11, with a higher value indicating a higher level of official supervisory power.

With regard to the variable Barth et al. (2001) use to quantify the private monitoring activity (PMA), it tries to capture the extent to which market/private supervision works in different countries. We can break up this variable into four sub-variables investigating:

- whether an external audit of the bank financial reports is required or not and, if yes, whether it must be provided by a certified auditor. If both factors are yes a 1 is assigned; 0 otherwise;
- whether accrued, though unpaid, interest/principal enter the income statement while the loan is still non-performing, whether financial institutions are required to produce consolidated accounts covering all bank and any non-bank financial subsidiaries (including affiliates of common holding companies), and, finally, whether bank directors are legally liable if information disclosed is erroneous or misleading. If all three factors exist a 1 is assigned; 0 otherwise;
- the number of the top 10 banks – in terms of total domestic assets – that are rated by international rating agencies. A 1 is assigned only if all the 10 banks are rated.
- whether there is an explicit deposit insurance protection system, and whether insured depositors were wholly compensated (to the extent of legal protection) the last time a bank failed. This variable takes the value of 1 if the answers of both the previous questions are no; 0 otherwise.

In addition to the previous sub-variables, three other measures are included in the index, based on "yes or no" answers, detecting:

- whether subordinated debt is allowable as part of regulatory capital;
- whether off-balance sheet items are disclosed to the public;
- and, finally, whether banks must disclose their risk management procedures to the public.

PMA ranges from 0 to 7, where the closer to 7 it is, the higher it is the monitoring exerted by market/private forces.

Both of the described variables – OSP and PMA – are expected to be negatively associated with income smoothing: monitoring activity, regardless of who exerts it, is supposed to reduce risk taking incentives by bank managers and, therefore, makes them less willing to be involved in earnings smoothing practices. To test the influence of these cross-country variables, we use the following regression equation:

Equation 7.1

$$LLP_{i,t} = a_0 + a_1 \Delta NPL_{i,t} + a_2 \Delta LOAN_{i,t} + a_3 EBTP_{i,t} + a_4 T1R_{i,t}$$
$$+ a_5 TA_{i,t} + a_6 GDPGR_{j,t} + a_7 BANK_j + a_8 BANK_j \bullet EBTP_{t,t} + a_9 OSP_j + a_{10} OSP_j \bullet EBTP_{i,t}$$
$$+ a_{11} PM_j + a_{12} PM_j \bullet EBTP_{i,t} + \sum \gamma_j C_j + \sum \theta_t Y_t + \varepsilon_{i,t}$$

In this model we add the interaction terms BANK●EBTP, OSP●EBTP and PM●EBTP in order to detect whether these institutional factors can help to explain differences in income smoothing behavior. As in equation 4.1, we add country and time dummies to control for the different levels of loan loss provisions across countries, and to capture any unobserved time-invariant effect not included in the regression, respectively.

7.2. Cross-country determinants of income smoothing: EU banks versus non-EU banks

In this paragraph we test for the impact of the previously defined variables – BANK, OSP and PMA – on our sample banks, separately running the regression equation 5.1 for the EU banks and for non-EU banks. As done before for capital and earnings management hypotheses, and for the signaling hypothesis, in order to detect whether the observed differences between the two set of coefficients are significant, the following equation is estimated for the pooled sample:

Equation 7.2

$$LLP_{i,t} = a_0 + a_1 \Delta NPL_{i,t} + a_2 \Delta LOAN_{i,t} + a_3 EBTP_{i,t} + a_4 T1R_{i,t}$$
$$+ a_5 TA_{i,t} + a_6 GDPGR_{j,t} + a_7 BANK + a_8 BANK \bullet EBTP_{t,t} + a_9 OSP_J + a_{10} OSP_J \bullet EBTP_{i,t}$$
$$+ a_{11} PM_J + a_{12} PM_J \bullet EBTP_{i,t} + \sum \gamma_j C_j + \sum \theta_t Y_t + \beta_1 EU + \beta_2 EU \bullet \Delta NPL_{i,t} + \beta_3 EU \bullet \Delta LOAN_{i,t}$$
$$+ \beta_4 EU \bullet EBTP_{i,t} + \beta_5 EU \bullet T1R_{i,t} + \beta_6 EU \bullet TA_{i,t} + \beta_7 EU \bullet GDPGR_{j,t} + \beta_8 EU \bullet BANK_J +$$
$$\beta_9 EU \bullet BANK_J \bullet EBTP_{t,t} + \beta_{10} EU \bullet OSP_J + \beta_{11} EU \bullet OSP_J \bullet EBTP_{i,t} + \beta_{11} EU \bullet PM_J +$$
$$\beta_{12} EU \bullet PM_J \bullet EBTP_{i,t} + EU \bullet \sum \gamma\gamma_j C_j + EU \bullet \sum \theta\theta_t Y_t + \varepsilon_{i,t}$$

The β coefficients represent the differences between the coefficients from the two sub-samples and the statistical significance of these coefficients may be used to support or not statistical differences. EU is a sample binary variable, equal to 1 if bank *i* is from one of the European Union countries, 0 otherwise.

We focus on the evidence reported in regressions number 4, 8 and 12 in Table 7.1: these three regressions show the results for the comprehensive model using the whole set of explanatory variables, where in the remaining regression models we sequentially incorporate the variables BANK, OSP and PMA, and their interaction terms – BANK●EBTP, OSP●EBTP and PMA●EBTP – into the base model. In general, restrictions on bank activities (BANK), official supervisory power (OSP) and private monitoring (PMA) do not have any effect on income smoothing at EU banks where none of the interaction terms is statistically different from zero. Conversely, if we take into account the other group of countries, things are totally different: stricter regulations on bank activities, higher levels of official supervisory power and of private monitoring reduce the use of loan-loss provisions to smooth income, since the interaction terms have the expected, negative sign. Furthermore, as we can observe at the bottom of the last column in Table 7.1, in regression 12, where we considered the combined sample, all the interaction terms we use to test differences from the EU and non-EU banks are statistically different from zero. Thus, we can firmly reject the hypothesis that restrictions on bank activities, official and private supervisory have the same impact on income smoothing practices at EU and non-EU banks, in the sense that they reduce incentives to smooth earnings in non-EU banking systems.

Tabella 7.1: Bank income smoothing and cross-country determinants: EU versus non-EU banks

LLP is the natural logarithm of loan-loss provisions; ΔNPL is the natural logarithm of the change in non performing loans; ΔLOAN is the natural logarithm of the change in total customer loans; EBTP is the natural logarithm of earnings before taxes and loan-loss provisions; T1R is the natural logarithm of Tier 1 capital ratio; GDPGR is the GDP growth rate; TA is the natural logarithm of total assets; BANK is a variable that measures restrictions on banking activity; OSP is a variable that measures the entity of official supervisory power; PMA is a variable that measures the entity of private monitoring; EU is a dummy variable that takes the value 1 for banks from EU countries, 0 otherwise.

	DEPENDENT VARIABLE – LLP											
	EU BANKS				NON-EU BANKS				EU + NON-EU BANKS			
VARIABLE	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Reg. 10	Reg. 11	Reg. 12
Intercept	-0.4436	-2.3891***	-0.702	-0.5282	2.7617	-2.9939**	-2.3969**	-10.1977**	-0.0696	-1.9700***	-0.2903	-0.5039
NPL	0.0750***	0.0718***	0.0737***	0.0701***	0.0811***	0.0806***	0.0778***	0.0772***	0.0774***	0.0760***	0.0741**	0.0731**
LOAN	-0.1276**	-0.1277**	-0.1321**	-0.1273**	0.1799***	0.1831***	0.1878***	0.1681**	0.2146***	0.2204***	0.2260***	0.2028***
EBTP	0.5948***	0.7954***	0.5871***	0.4963**	0.7909***	0.8847***	0.9651***	2.3293***	0.8465***	0.8216***	0.8843***	2.3689***
T1R	-0.3358***	-0.3368***	-0.3553***	-0.3489***	0.1601	0.1798	0.1763	0.1756	0.1169	0.1358	0.1333	0.1304
GDPGR	-0.0291	-0.0312	-0.0332	-0.0331	-0.0863*	-0.0810*	-0.0942**	-0.0715	-0.0454	-0.04	-0.0543	-0.0353
TA	0.2127**	0.2111**	0.2108**	0.2061**	-0.0089	0.0112	-0.0322	0.0468	0.0382	0.0532	0.014	0.0954
BANK	-0.0492	-	-	-0.1316**	-0.3769	-	-	0.3714*	-0.1177	-	-	-0.1174
BANK●EBTP	0.0097	-	-	0.0136	-0.028	-	-	-0.0705**	-0.0405	-	-	-0.0826**
OSP	-	0.2033**	-	0.1861**	-	0.2426*	-	0.3608**	-	0.1323	-	0.0456
OSP●EBTP	-	-0.0217	-	-0.0148	-	-0.0574**	-	-0.0872***	-	-0.0550**	-	-0.0879***
PMA	-	-	-0.0649	-0.0942	-	-	0.4223*	0.8608**	-	-	-0.0387	0.1528
PMA●EBTP	-	-	0.0202	0.0308	-	-	-0.1070*	-0.1754***	-	-	-0.0998	-0.1710**
EU	-	-	-	-	-	-	-	-	0.0000	0.0000	0.0000	0.0000
EU●NPL	-	-	-	-	-	-	-	-	-0.0035	-0.0051	-0.0014	-0.0043
EU●LOAN	-	-	-	-	-	-	-	-	-0.3533***	-0.3602***	-0.3701***	-0.3420***
EU●EBTP	-	-	-	-	-	-	-	-	-0.2536	-0.0257	-0.2974	-1.8821***
EU●T1R	-	-	-	-	-	-	-	-	-0.4600**	-0.4788***	-0.4974***	-0.4872***
EU●GDPGR	-	-	-	-	-	-	-	-	0.0199	0.009	0.0283	0.0108
EU●TA	-	-	-	-	-	-	-	-	0.1692	0.1518	0.1908	0.1048
EU●BANK	-	-	-	-	-	-	-	-	0.0713	-	-	-0.0154
EU●BANK●EBTP	-	-	-	-	-	-	-	-	0.0505	-	-	0.0967**
EU●OSP	-	-	-	-	-	-	-	-	-	0.0748	-	0.1443
EU●OSP●EBTP	-	-	-	-	-	-	-	-	-	0.0334	-	0.0734**
EU●PMA	-	-	-	-	-	-	-	-	-	-	-0.0122	-0.247
EU●PMA●EBTP	-	-	-	-	-	-	-	-	-	-	0.1204	0.2027***
Adjusted R2	0.7637	0.764	0.7636	0.7643	0.8596	0.8621	0.8606	0.8659	0.8004	0.8012	0.8004	0.8031
F-statistics	64.874	64.9552	64.8314	60.9301	74.7169	76.2554	75.3275	73.1587	76.6625	77.0559	76.6975	71.9326
Number of observations	574	574	574	574	314	314	314	314	888	888	888	888

Note: ***, **, * = significance level of 1%, 5%, and 10%, respectively.

8. Conclusions

This paper reexamines earnings and capital management, and signaling explanations for the choice, by banks, of loan-loss provisions for a sample of 907 European banks from 37 countries over the 11-year period 1996-2006, using data from the Bureau van Dijk's Thompson BankScope database. We also test the impact of some cross-country determinants on bank income smoothing, such as bank regulation and bank supervision. How banks account for impaired loans has a strategic impact on their reported earnings and capital, and has been largely investigated by previous literature. Nevertheless, empirical results on these issues are not consistent, and are mainly focused on U.S. banks.

In particular, in our paper, we attempt to detect whether banks located in countries that are members of the European Union, as of December 1996 (with the exception of Spain because of the special regime of "statistical" or "dynamic" provisions set by regulatory authorities in June 2000), behave differently, relative to firms located in non-EU countries.[23]

Overall, we find evidence that: (i) loan loss provisions reflect changes in the expected quality of banks' loan portfolio, measured by the change in the amount of nonperforming loans; (ii) capital management is an important determinant of loan loss provisions for EU banks, but it is not for non-EU banks; (iii) earnings management is an important factor affecting provisioning decisions for both EU and non-EU banks; (iv) the desire to signal private information to outsiders is an important factor in explaining provisioning policies for non-EU banks, but it is not important for EU credit institutions; (v) banks loan loss provisions are characterized by a pro-cyclical nature; and, finally, (vi) that restrictions on bank activities, official and private supervisory, have a different impact on income smoothing practices at EU and non-EU banks, in the sense that they reduce incentives to smooth earnings in non-EU banking systems.

Specifically, we find that the estimated elasticity of loan-loss provisions, with respect to the Tier 1 capital ratio, is negative at EU banks, as stated by the regulatory capital management hypothesis, whereas the coefficient has a positive sign and is marginally significant at the 10% level for non-EU credit institutions. Elasticity of loan-loss provisions, with respect to earnings before provisions and taxes, is positive and significant at 1% level for both EU banks and non-EU banks, thus strongly supporting the income smoothing hypothesis. The difference between the coefficients on EU banks' Tier 1 capital ratio and the coefficient on non-EU banks is significantly negative. This result suggests that EU banks are much more involved in capital management practices via loan-loss provisions than are non-EU credit institutions.

[23] The non-EU group comprises Andorra, Albania, Armenia, Azerbaijan, Bosnia-Herzegovina, Bulgaria, Belarus, Switzerland, Georgia, Croatia, Iceland, Liechtenstein, Monaco, Moldova, Montenegro, Macedonia, Norway, Romania, Serbia, Russian Federation, San Marino, Turkey, and Ukraine.

As to the use of loan-loss provisions as a signaling device, we do not find evidence supporting the idea that EU banks use LLPs to signal a bank's future profits. In contrast, we do find evidence supporting this hypothesis for non-EU banks: an increase in loan-loss provisions at time *t* is associated with higher reported earnings at time *t+1*. Not only is the difference in coefficients on one-year-ahead earnings before taxes and provisions significant: since the coefficient is not significantly different from zero for EU banks, the analysis suggests that EU credit institutions do not rely on this kind of signal to transmit to the market their expectations about future performances. Consequently, we can conclude that loan-loss provisions do not appear to be used as a signaling device within the group of EU countries. Nevertheless, this inconsistent finding could be due to loan loss provisions seen as an expense rather than as a form of future profitability.

Finally, our analysis points out that restriction on bank activities, official supervisory power and private monitoring do not have any statistically relevant effect on income smoothing at EU banks. Conversely, stricter regulations on bank activities, higher levels of official supervisory power and of private monitoring reduce the use of loan-loss provisions to smooth income at non-EU credit institutions, and this different impact is statistically significant.

Research on the use of loan-loss provisions is meaningful for banking supervisors who will have to ensure that provisions actually cover expected losses, and that capital is used for unexpected losses. From a prudential point of view, the empirical evidence points out the need for a sound accounting framework since our findings support the probability that reported financial numbers may not reflect the underlying economic reality of European banks.

A natural extension to the analysis developed here is the consideration of a more in-depth study that takes account of specific factors and regulatory practices in individual countries. Further research should try to provide evidence about the usefulness of the new Basel II banking regulation, with particular regard to the efforts in increasing market discipline since, as stated by Fonseca and González (2008), both greater disclosure requirements (Pillar III), and a stricter supervision (Pillar II) can increase the reliability of a bank's financial statements.

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