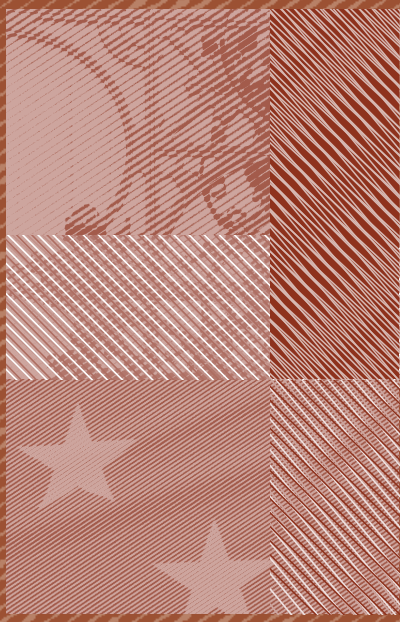
DO DYNAMIC PROVISIONS REDUCE INCOME SMOOTHING USING LOAN LOSS PROVISIONS?

2011

Daniel Pérez, Vicente Salas-Fumás
and Jesús Saurina



Documentos de Trabajo
N.º 1118

BANCO DE **ESPAÑA**
Eurosistema

DO DYNAMIC PROVISIONS REDUCE INCOME SMOOTHING USING LOAN LOSS PROVISIONS?

DO DYNAMIC PROVISIONS REDUCE INCOME SMOOTHING USING LOAN LOSS PROVISIONS? (*)

Daniel Pérez

BANCO DE ESPAÑA

Vicente Salas-Fumás

UNIVERSIDAD DE ZARAGOZA AND BANCO DE ESPAÑA

Jesús Saurina (**)

BANCO DE ESPAÑA

(*) This paper is the sole responsibility of its authors and the views represented here do not necessarily reflect those of the Banco de España. The final version of the paper has benefited from the comments of an anonymous referee and the editor, Juan Ayuso, as well as those of P. Molineux and G. Lóránth, discussants when it was presented at the XXII Moneda y Crédito Symposium, and the rest of particiants, in particular R. Blanco and J. Suárez.

(**) Address for correspondence: Jesús Saurina; C/ Alcalá 48, 28014 Madrid, Spain. Tel: + 34 91 338 5080; e-mail: jsaurina@bde.es.

Documentos de Trabajo. N.º 1118
2011

ISSN: 0213-2710 (print)
ISSN: 1579-8666 (on line)
Depósito legal: M. 35730-2011
Unidad de Publicaciones, Banco de España

Abstract

Spanish banks had to set aside a countercyclical loan loss provision during the period 2000-2004. The amount of such provision as well as the allowance accumulated had to be disclosed by banks. The former creates a natural experiment to test whether banks smooth earnings to mislead investors and other interested parties, or, by contrast, income smoothing is used to avoid the existence of market frictions. Using panel data econometric techniques, we find evidence of income smoothing through loan loss provisions during the period previous to the implementation of the countercyclical provision (1988-1999). However, during 2000-2004, banks relied only on the newly created countercyclical provision to smooth income. This change in behaviour suggests that there may be efficiency gains in reducing the volatility of accounting earnings over time.

JEL: G18, G21, M41.

Keywords: income smoothing, earnings management, transparency, countercyclical provisioning.

Resumen

Los bancos españoles tuvieron que realizar provisiones estadísticas contracíclicas en el período 2000-2004. Los bancos tenían que comunicar los importes de dichas provisiones al mercado. Esto crea un experimento natural que permite testar si los bancos suavizan el resultado para despistar a los inversores o, por el contrario, el alisamiento del resultado se utiliza para aliviar fricciones existentes en los mercados. Utilizando técnicas econométricas de datos de panel, se encuentra evidencia de alisado de resultados mediante las provisiones en el período previo a la implantación de las provisiones contracíclicas. Sin embargo, durante el período 2000-2004, los bancos alisaron el resultado solo utilizando las provisiones contracíclicas. Este cambio de comportamiento sugiere que deben existir ganancias de eficiencia al reducir la volatilidad de los resultados contables a lo largo del tiempo.

JEL: G18, G21, M41.

Keywords: alisamiento del resultado, transparencia, provisiones contracíclicas.

1 Introduction

Earnings management, and particularly income smoothing, are well documented practices across firms and industries[1]. Moreover, several papers have provided evidence of the use of loan loss provisions[2] by banks to smooth earnings[3].

Some of the explanations for earnings management practices refer to the conflict of interest between managers and shareholders, together with information asymmetries that limit the use of efficient contracts to solve them, Lambert (1984), Fudenberg and Tirole (1995). For example, managers with stock options in their compensation packages could make discretionary accounting decisions to distort profits and share prices around the time period when these stock options are going to be exercised, Bergstresser and Philippon (2006). Other explanations are based on the existence of market frictions, so that shareholders will benefit from a reduction in earnings volatility over time. Within this literature, income smoothing can respond to signalling purposes, Barnea, Ronen and Sadan (1975); to the intention of reducing potential losses from shareholders' liquidity trade, Goel and Thakor (2003); to save on profit taxes, Beatty, Chamberlain and Magliolo (1995), Collins, Shackelford and Wahlen (1995), Rozycki (1997); or to lower the perceived probability of bankruptcy, Trueman and Titman (1988).

Evidence on whether income smoothing practices obey to the purpose of bank managers to mislead investors and other interested parties or, on the contrary, they respond to market imperfections, could be obtained if banks had at their disposal a method to smooth earnings that was transparent to investors. If income smoothing practices did only respond to efficiency considerations, once a transparent smoothing device was introduced, then managers would reduce or eliminate the use of discretionary loan loss provisions to manage earnings. On the other hand, if banks were trying to mislead investors, income smoothing will continue afterwards. Hunton, Libby and Mazza (2006) find that more transparent reporting requirements will reduce earnings management or will change the focus of earnings management to less visible methods.

In some countries, for example in the US, accounting regulations stress the importance of accurate measurement of earnings in each time period, Wall and Koch (2000). In others, bank supervisory authorities and accounting regulations may be more tolerant with the use of loan loss provisions to create additional reserves. However, such reserves, and thus the actual provisions used for this purpose are hidden to external parties. In a framework like this, if banks have practiced income smoothing it would be in a non-transparent way.

The introduction in Spain of a countercyclical loan loss provision, the so-called statistical provision, a few years ago, offers a unique natural experiment to test whether

---

1. See Healy (1985), Bannister and Newman (1996), Subramanyan (1996), Burgstahler and Dichev (1997), Bergstresser and Philippon (2006), Liu and Ryan (2006), McVay (2006), among others.

2. We use the term loan loss provisions to refer to the reduction in net income that recognizes the credit losses incurred during the period (i.e. the US equivalent term would be provisions for loan and leases losses) while the accrual of these provisions we call it loan loss reserve (the equivalent US term would be allowance for loan and leases losses).

3. See Greenawalt and Sinkey (1988), Ma (1988), Moyer (1990), Scholes, Wilson and Wolfson (1990), Wahlen (1994), Wetmore and Brick (1994), Beatty, Chamberlain and Magliolo (1995), Collins Shackelford and Wahlen (1995), Kim and Kross (1998), Ahmed, Takeda and Thomas (1999), Liu and Ryan (2006). Note that banks might use other items of the profit and loss account to manage earnings, but this possibility is out of the scope of this paper.

income smoothing responds to distorted managerial incentives and behaviour or, to the contrary, it may respond to efficiency considerations in the presence of market imperfections. This provision is explicitly intended to smooth bank profits over the business cycle, Fernández de Lis, Martínez and Saurina (2001). If Spanish banks used general and specific loan loss provisions to smooth earnings before year 2000, when the statistical provision was introduced, but stopped doing it after this date, it could be inferred that previous accounting practices to reduce earnings volatility responded to efficiency considerations. This is because the statistical provision is transparent and thus it leaves unchanged the outsiders' opportunities to evaluate managerial performance. Stopping the old smoothing practices, bank managers avoid the costs of discretionary accounting and achieve the desired result of accounting profit stability over time complying with the new regulatory requirements.

On the contrary, if banks continue using loan loss provisions (other than the statistical provision) to smooth earnings after year 2000, the conclusion would be that they are aware that outsiders can use the same measure of profits than before to evaluate performance by simply adding back the statistical provision to the net accounting profit. This finding would support the explanation of smoothing in terms of managers' interests to obtain private benefits at the expense of shareholders, together with failures in managerial evaluation and compensation practices.

We find that Spanish banks use loan loss provisions to smooth earnings until year 2000, but stop doing so afterwards. Our conclusion is that income smoothing practices through general and specific provisions, before the introduction of an explicit and transparent smoothing mechanism, among Spanish banks could respond to efficiency considerations, for instance to publish more stable profits and dividends over time in order to lower the perceived bankruptcy probability. The statistical provision makes unnecessary such practices, which are likely to have a cost for the banks (for example, in terms of lower regulatory capital, as in Spain capital regulation excluded loan loss reserves from tier 1 and from tier 2 regulatory capital) and they are stopped once the final purpose of stabilizing the net accounting profit is attained in a regulatory sponsored way.

The rest of the paper is organised as follows. Section 2 presents a thorough description of the regulation and the change in the framework of loan loss provisions in Spain. Section 3 explains the econometric framework used to test income smoothing as well as the database. In section 4 we present the results of the empirical analysis and the discussion of the results. Section 5 concludes.

2 Loan loss provision framework in Spain

Banco de España sets the accounting rules for credit institutions in Spain. Among them, it sets the rules for loan loss provisions. Such rules are very detailed in comparison with international standards, as it is explained in the following paragraphs[4]. Until year 2000, there were two classes of loan loss provisions: the specific and the general loan loss provisions (and their respective reserves or allowances).

2.1 Specific loan loss provisions

Specific loan loss provisions were applied over impaired loans, defined as those loans overdue 90 days or more. For those loans overdue between 3 and 6 months, the specific provision to be set aside was 10% of the amount overdue. The amount overdue between 6 and 12 months had a specific provision of 25%; between 12 and 18 months 50%; between 18 and 21 months, 75%. Finally, if the time elapsed in the overdue status was more than 21 months, the specific provision had to reach the 100%, that is, full coverage of the overdue loan after 21 months overdue or 2 years after the first date of delinquency. Therefore, the specific provision was tied to the time and the amount overdue.

The former calendar for specific provisions had a significant exception. Specific provisions for impaired mortgages (with a loan to value ratio up to 80%) were much more protracted in time. For loans overdue up to 3 years, there was no provisioning requirement; between 3 and 4 years, 25%; between 4 and 5 years, 50%; between 5 and 6 years, 75%; and 100% for those past due 6 years.

In most countries, specific provisions are applied over the total amount pending, not just on the overdue amount. In the case of Spain, only if a loan had been in arrears for one year, the provision was applied to the whole amount due, not only to the instalments overdue. That is, for mortgages in arrears, the first 25% provision (in years 3 to 4) was applied over the total amount of the loan pending. Moreover, if the 25% of the due amount was overdue, the whole outstanding amount of the loan had to be used in order to calculate the specific provision for that loan. In addition, there were thresholds and linkages between several facilities pertaining to the same borrower in order to determine the final coverage. For example, if a borrower had several loans from a bank, when the overdue amount reached the 25% of the total due amount of the borrower, the specific provision had to be set aside based on that whole amount, and not only on the overdue loans.

Note that the Spanish regulation also allowed to classify as doubtful an asset that was still performing, but with a high probability of becoming impaired (i.e. defaulted). Banks' managers, when deciding to classify an asset under this category, should follow objective criteria. In this case the specific provision had to be set as a function of the expected loss, and the bank had to estimate this expected loss following the most prudent criteria. In any case, there was a minimum specific provision (25%) for those assets classified as doubtful, but still performing.

4. We focus on the period 1988-2004. Since January 2005 the International Financial Reporting Standards (IFRS, formerly, International Accounting Standards or IAS) have come into effect in Spain, changing again loan loss provision rules.

In spite of the former set of detailed rules, in contrast with many countries, including the US, where the amount of specific and general loan loss provisions is left to managers' judgement [Beattie et al. (1995) and World Bank (2002)], Spanish banks retain some room for discretion, both in terms of the classification of an asset as doubtful, and in terms of the specific provision to be set aside (in particular, for those doubtful assets still performing). For instance, it is possible to classify a loan as doubtful even if it is still performing in cases where the probability of default is high (such a probability has to be evaluated by banks' managers). In those cases, the specific provisions aim at covering the expected loss, which, again, must be estimated by banks' managers. Although there are some objective criteria to guide this process (a minimum provision threshold of 10% or 25% depending on the available information about the loan and the quality of the borrower), banks have a certain degree of discretion in setting those provisions (for instance, misclassifying assets and over or under provisioning expected losses). Such discretion can go either way: more doubtful assets and, thus, more provisions or vice versa[5].

Indirect evidence of the former stems from banks' annual reports which sometimes and for particular banks show significant changes (increases usually) in loan loss provisions. Usually, such changes come soon after a supervisor inspection of the loan portfolio quality of the bank. Thus, bank managers seem to have certain discretion to classify loans (i.e. unimpaired versus impaired) and to set aside provisions, despite the detailed set of rules governing Spanish loan loss provisions[6].

2.2 General loan loss provisions

Apart from the specific provisions, during the period analysed Spain also had in place a compulsory general provision for unimpaired loans. The provision was 1% of the amount granted for all loans except for mortgages (with loan to value ratio up to 80%) that was set at 0.5%. That is, at inception, when the loan was granted banks had to set aside a general provision calculated over the whole amount lend. That provision was applied only to unimpaired loans.

2.3 Countercyclical loan loss provisions

From July 2000 until the end of 2004 Spanish banks have accrued a countercyclical loan loss provision the so-called statistical provision. A detailed explanation of its rational, objectives and mechanism is in Fernández de Lis, Martínez and Saurina (2001). As mentioned before, from 2005 onwards, Spanish accounting rules follow the International Financial Reporting Standards[7].

Essentially, the statistical provision is so that during good times, Spanish banks have to set aside provisions for the expected losses that are embedded in expanding credit portfolios. The provisions made during those years are used to build up the so-called statistical reserve (or statistical allowance) that might be depleted in bad times when the excesses of the last upturn appear in the form of impaired assets. The former is achieved by comparing every quarter the latent loss in the credit portfolio with the amount of specific

---

5. Moreover, as Ball, Kothari and Robin (2000) point out, reported accounting amounts reflect not only the accounting rules in place but also the degree to which institutions exist to enforce them.

6. Significant declines in loan loss provisions as a result of asset reclassifications after inspections are more rare as a prudential supervisor is more inclined to accept buffers (such as allowances for loan losses) that will help the bank to cope with future difficulties.

7. Laeven and Majnoni (2003) link this provision with the cyclical oscillations of bank reserves proposed by Holmstrom and Tirole (2000). Readers interested in the changes in the loan loss provisioning system in Spain after 2005 as well as its impact may refer to Saurina (2009a and 2009b).

provisions (which fluctuates significantly along the business cycle). That difference, if positive, is charged into the Profit and Loss account (P&L) whereas, if negative, is written as income in the P&L statement (provided that the statistical reserve has been previously build up). Given that the specific loan loss provisions are tied up to impaired loans, which fluctuate markedly according to the business cycle, during good times the specific provisions are very low and, thus, the statistical provision is positive, increasing the size of the statistical reserve. In bad times, when impaired loans increase significantly, the statistical provision becomes negative, depleting the statistical reserve accrued along good times. That is the reason why the statistical provision is countercyclical: in good times increases while decreasing in bad times.

The latent loss, for most of the banks, is calculated using a standard approach given by Banco de España[8]. This approach consists on six buckets (ordered form low to high credit risk) and a set of 6 fixed parameters associated to each bucket. Thus, the loan portfolio is divided in six categories (i.e. loans to governments, mortgages, other garanteed loans, loans to firms, consumption loans and credit cards), each one with a parameter that proxies the average loss along the business cycle (from 0.1% to 1.5%). The latent loss is calculated as the parameter times the exposure in each risk bucket and added up across the six risk categories. The standard approach used to calculate the latent loss means that, in general, all banks present a similar smooth pattern of latent losses along the business cycle. The variability along the cycle comes from the specific provision, which is very low in good times (very low levels of overdue loans), and very high in bad ones, when impairments and problem loans increase significantly.

All in all, from 2000 to 2004, the total loan loss provision (TLLP) of Spanish banks was:

$$TLLP = SP + GP + \left(Lr - SP\right) \tag{1}$$

where, *SP* stands for the specific provision, *GP* for the general one and *Lr* for the latent loss. The term between brackets is the countercyclical or statistical provision.

By design, the inclusion of a statistical provision produces flat total loan loss provision ratios (i.e. loan loss provisions over total loans) through the business cycle (both *GP* and *Lr* are mainly constant in relative terms along the cycle). Thus, the statistical provision introduces a smoothing mechanism in loan loss provisions and, by extension, in bank profits[9].

Moreover, and this is of key importance for the issue we are pursuing in this paper, the countercyclical mechanism is transparent since each bank is obliged to disclose the amount of the statistical provision. Therefore, in fact, investors and any other interested parties can separate the smoothing effect brought about by the statistical provision. Conversely, bank managers know that the smoothing effect of the new provisioning tool is fully observed and appraised by outsiders.

The interest of the paper is to test whether or not bank managers have changed their behaviour regarding smoothing of profits through general and specific loan loss provisions once they have at their disposal a transparent income smoothing device.

---

8. Banco de España also allows banks to develop and use their own internal models to compute the statistical provision. In this case, the model must be approved by Banco de España.
9. We show this more in detail in Appendix 1.

3 Econometric model and data set

In order to evaluate the impact of the transparent smoothing device in the behaviour of banks, we set out the standard test of income smoothing proposed in the literature[10]. We differentiate two periods, before the statistical provision (1988-1999) and when it was in force (2000-2004). The hypothesis to be tested is that loan loss provisions excluded the statistical one, $CLLP_{it}$, are determined as a combination of the credit risk position of the bank and of the level of profits unaffected by the provision, NOI_{it}. The model is extended including lagged regulatory capital, $C_{it-1,}$ (to account for possible capital management in addition to income smoothing in loan loss provision decisions) and includes also a list of control variables:

$$CLLP_{it} = \alpha + \delta f(CREDIT \quad RISK) + \beta NOI_{it} + \gamma C_{it-1} + \mu Control \quad Variables + \eta_i + \varepsilon_{it}$$

where α, δ, β, γ, μ are parameters to be estimated. Therefore, if loan loss provisions are set *only* as a response to credit risk, β and γ are equal to zero (i.e. banks do not use loan loss provisions to manage profits and/or capital). The null hypothesis of no income smoothing is made under the premise that smoothing can be costly (for example, in terms of lower retained earnings).

Equation (2) resembles the empirical model used in the literature either to test for income smoothing, to test for capital management, or both. Greenawalt and Sinkey (1988), Ma (1988) and Wetmore and Brick (1994) all regress loan loss provisions on current net operating income, non-performing loan ratios and some additional variables as credit portfolio structure. The empirical literature on banks usually analyses both income smoothing and capital management at the same time. Ahmed, Takeda and Thomas (1999) regresses loan loss provisions on earnings before provisions and tier 1 capital before loan loss reserves. A similar equation and explanatory variables are used in Beatty, Chamberlain and Magliolo (1995), Collins, Shackelford, and Wahlen (1995) and Moyer (1990), although as a part of a multiple equation framework where other discretionary items are also considered. Wahlen (1994) and Kim and Kross (1998) focus only on loan loss provisions and charge-offs simultaneously[11].

Greenawalt and Sinkey (1988); Ma (1988); Scholes, Wilson and Wolfson (1990); Wahlen (1994); Collins, Shackelford, and Wahlen (1995); and Kim and Kross (1998) find evidence on income smoothing with loan loss provisions whilst Wetmore and Brick (1994), and Ahmed, Takeda and Thomas (1999) reject it. Moyer (1990), Beatty, Chamberlain and Magliolo (1995) and Ahmed, Takeda and Thomas (1999) find evidence of a negative relationship between capital and loan loss provisions for US banks. Kim and Kross (1998) find evidence of capital management in low capitalised banks.

Once the credit risk and control variables are made explicit, the empirical model to be estimated is formulated as follows:

$$CLLP_{it} = C + \delta_1 NPL_{it} + \delta_2 IBOL_t + \delta_3 LTA_{it} + \delta_4 GDPG_t + + \beta NOI_{it} + \gamma CAP_{it-1} + \mu SIZE_{it} + \eta_i + \varepsilon_{it}$$

10. See, for instance, Ahmed, Takeda and Thomas (1999).

11. Beaver et al. (1989); Wahlen (1994); Beaver and Engle (1996) and Liu, Ryan and Wahlen (1997) focus on the impact of loan loss provisions on the market value of the banks, distinguishing between the discretionary and the non-discretionary components of LLP.

The dependent variable $CLLP_{it}$ is the value of net loan loss provisions excluded the statistical one of bank *i* in year *t*. The variable is normalised by the total assets of the bank to avoid spurious size effects in the explanation of provisions.

The variables that proxy the credit risk of the bank, CREDIT RISK, are *NPL, IBOL, LTA* and *GDPD*. The variable *NPL* measures the doubtful assets of bank *i* in period *t*, according to its balance sheet data, and normalised by the total assets of the bank[12]. *IBOL* is the general index of stocks listed in the Madrid Stock exchange also in year t. It is intended to capture expectations about future economic conditions which can affect the current loan loss provision decisions of banks. *LTA*, the ratio of total loans to total assets, is a proxy for the risk profile of the bank. The more loans to the retail or the corporate sector, the higher the risk tolerance of bank managers (the alternative is to buy far safer Spanish government bonds or to lend to other Spanish banks). *GDPG* is the rate of growth of Spanish Gross Domestic Product in year t. It is intended to capture the effect of macroeconomic conditions (business cycle) on loan loss provisions, beyond the risk profile of a particular bank. Coefficients of *NPL* and *LTA* are expected to be positive and those of *IBOL* and GDPG negative.

The inclusion of an explicit measure of the business cycle offers us the possibility of testing the cyclical pattern of *CLLP*, when controlling for other explanatory variables. The strong cyclical pattern of loan loss provisions was one of the prudential arguments used by Banco de España to create the statistical provision[13], coupled with the well known fact that credit risk mistakes are made during good times when over optimism is pervasive and credit standards are relaxed [Crockett (1997), Rajan (1994) and Manove and Padilla (1999)].

The variable *NOI* is the net operating income (profits before provisions and extraordinary items) of bank i in period t, normalised by total assets of the bank. If there is income smoothing a positive and significant value for the coefficient of this explanatory variable is expected.

The variable *CAP* is the total capital ratio of the bank at the beginning of period t (end of period *t-1).* The numerator does not include the general loan loss reserve and the denominator is the risk-weighted assets (RWA). Under Spanish regulation, general loan loss reserves are excluded from regulatory capital (i.e. not counted as tier 2 capital)[14]. If banks determine general and specific loan loss provisions with the purpose of managing capital, a positive coefficient is expected for this variable[15].

The variable *SIZE* is the log of total assets. It is included as a control variable. We do not have any strong *a priori* about the expected sign, although credit portfolio diversification would point towards a negative sign for μ.

---

12. We focus on the level of the non-performing loans ratio instead of in the change in the ratio. That is mainly the result of the Spanish system of recognition of problem loans. Usually, after 90 days of an overdue loan, the whole amount of the loan is classified as non-performing and specific provisions start to be made. However, in Spain, only the overdue part of the loan is classified as non-performing and being provisioned. Thus, non-performing loans evolve much less abruptly than abroad. Instead of a big jump after 90 days overdue, the increase in problem loans is more deferred along time.

13. Laeven and Majnoni (2003) are also interested in testing the cyclical pattern of loan loss provisions. More generally, during Basel II discussions, the issue of procyclicality of capital requirements has risen a lot of attention. Taylor and Goodhart (2004) contain a good summary of that discussion as well as many references. Note that procyclicality of loan loss provisions would increase additionally the pressure on bank capital during bad times. More generally, the role of accounting standards on financial stability is addressed in Plantin, Sapra and Shin (2005).

14. Note that, in other frameworks, general provisions are counted as tier 2 capital. For instance, in Basel I they can be included in the definition of tier 2 with the limit of 1.25% of the risk-weighted assets.

15. Some papers test for capital management using un-weighted total assets due to the lack of data on RWA.

Finally, η_i reflects unobserved bank-individual characteristics that are constant along time. Among those characteristics, it should be included the bank risk profile. Credit policies are not changed from one day to the other. Usually, they are deeply established and permeate the whole banking organisation. Therefore, it is possible to assign to each bank a kind of characteristic risk profile that defines its particular way to manage credit risk. ε_{it} is the random error.

In order to test the change in the behaviour of bank managers, we run regression (3) through two separate periods, before and after 2000. The comparison of parameter β across both time periods will inform us of any possible change in behaviour.

Equation (3) is estimated with the DPD package developed by Arellano and Bond (1988). Variables are in differences to control for unobserved bank individual effects. Since *CLLP* and some of the explanatory variables, *NPL*, *NOI*, *LTA*, *CAP*, can be jointly determined we make use of the Arellano and Bond (1991) GMM estimator for *NPL*, *LTA*, *CAP* and *NOI* using as instruments two and three-year lags of these four variables.

3.1 Data set

The data come from accounting statements of consolidated banking groups from 1988 till 2004. We focus on consolidated data because capital requirements are calculated at a group level, irrespective that each individual bank has to have satisfactory available capital. Both commercial and savings banks have been included, representing more than 95% of total market share of credit institutions. Only foreign bank branches and credit co-operatives have been excluded. Our panel is unbalanced since new institutions have started to operate during the period considered while others have ceased to exist. Under these premises an unbalanced panel has been obtained comprising up to 138 banks over a period of up to 17 years, totalling 1374 observations.

Table 1 shows the descriptive statistics of the variables. The flow of statistical and general loan loss provisions is, on average, around 0.4% of total assets. However, there is quite variation across banks, with a maximum of 3.56% of total assets and a minimum of -1.12%, which means that the bank recovered loan loss provisions set aside previously as a result of an improvement in the non-performing loans. The problem loans ratio also shows a lot of variation as there are many differences across banks regarding risk appetite. The period analysed, 1988-2004, contains a whole business cycle, with a recession around 1993 and other periods of strong growth (i.e. GDP growth goes from a maximum of 5.1% in real terms to -1.03%). The loan specialization varies also across banks, with an average value around half of the total assets.

Regarding profitability and solvency, in average terms, the banks analysed in the sample, which cover more than 90% of total assets of Spanish banks, show a reasonable average operating income as a percent of total assets (1.38%), although some banks make losses some years. On the contrary, other banks earn fatter margins. Solvency levels are, on average, quite high, although some banks are below the minimum levels in some particular years[16].

16. Note that in Spain from 1985 to 1993 there was in place a capital adequacy ratio calculated as the higher of a ratio of equity over total assets of 5%, and a risk weighted assets ratio under which a different level of capital was required (going from 0.25% to 35%), depending on its risk level.

4 Empirical results and discussion

The first column of Table 2 contains the results of the estimation of equation (3) in first differences for the period 1988-1999. The results are the one-step estimates robust to heteroskedasticity provided by DPD. As expected, there is autocorrelation of first order but not of second order (through differentiation we have created artificially autocorrelation of first order in the residuals). The test of adequacy of instruments (Sargan test) is also satisfactory.

Regarding the *NOI*, its positive and significant coefficient rejects the null hypothesis that Spanish banks do not use general and specific loan loss provisions to smooth income in the period 1988 to 1999. Thus, despite the potential costs in terms of retained earnings, banks smooth their accounting profits.

Apart from being significant statistically, the impact of the smoothing practice is economically relevant. Computing the long-term semi-elasticity shows that an increase of 1 percentage point in NOI (from its average value of the period 1988-1999) might increase the ratio of the current specific and general loan loss provisions over total assets by 31%. Alternatively, one standard deviation increase in NOI means an increase in CLLP of 26%.

The remaining parameter estimates also provide interesting results. On the one hand, the parameter of the total capital ratio lagged one-year, *CAP*, is not significantly different from zero. Therefore, there is no evidence of capital management through loan loss provisions among Spanish banks.

On the other hand, the coefficients of the credit risk proxy variables all have the expected sign. The coefficient of non-performing loans over total assts, *NPL*, is positive and significant at the 1% level. Thus, the more overdue loans the bank has, the higher the provisions it sets aside. Similar results are obtained for the coefficient of loans over total assets, *LTA*, positive and significant. Thus, the riskier the bank, the more provisions it makes. *IBOL* and *GDPG* have negative estimated coefficients, both statistically significant at the 5% level. Expectations from the Stock market do affect current loan loss provision decisions of banks, after controlling for the rest of the variables. On the other hand, the business cycle affects loan loss provision decisions of banks, in a countercyclical way, even after controlling for the bank level risk variables, such as *NPL* and *LTA*. All in all, Spanish banks during the period 1988-1999 seem to set aside provisions according to their determinants. The control variable *SIZE* does not have a significant effect on loan loss provisions.

The second column of Table 2 shows the results for the period 2000-2004. Again, autocorrelation tests of the residuals are satisfactory as well as the Sargan test. The key parameter in column 2 results is the one of NOI. It is positive but it is not significantly different from zero. Therefore, it seems that in the period when the statistical provision was in place, bank managers stop using other loan loss provisions as an income smoothing mechanism. The fact that the statistical provision offers them a smoothing device could explain that change, even if it is a transparent mechanism. It might be possible that banks are not trying to hide *per se* their current profits (either upwards or downwards) but to provide some stability to the profit and loss account to avoid certain market imperfections.

Regarding the other variables, the coefficient of the non-performing loan ratio *(NPL)* is positive and statistically significant at the 1% level. Moreover, the estimated coefficient doubles that of the previous period and the coefficient of the GDP growth is negative and larger in absolute value[17], although only significant at the 10% level. For this period expectations from the stock exchange and the proxy for the risk profile of the bank (LTA) are not significant. Thus, now general and specific loan loss provisions respond relatively more to variables that reflect the direct risk profile of the bank (i.e. NPL) while other indirect risk proxies (LTA) are less informative. The same happens with GDPG and IBOL, the former a more direct measure of the business cycle position. As in the previous period, there is no evidence of capital management through general and specific loan loss provisions.

Columns 3 and 4 of Table 2 show the results of the income smoothing tests for the two time periods, before and after year 2000, allowing for possible differences in intensity of these practices between commercial and savings banks. We test whether commercial and savings banks, the former owned by shareholders and the latter with no shareholders (i.e. not-for-profit banks), behave similarly or not regarding smoothing through general and specific loan loss provisions. Such a test is performed using a dummy variable, BANK, worth 1 if the bank is a commercial one and zero if it is a savings bank, which multiplies the continuous variable *NOI*. If the parameter associated to such a multiplicative variable is significant, it means that the impact of smoothing differs across banks of different ownership form.

Column 3 results show that for the period 1988-1999, although there is evidence of smoothing through loan loss provisions in both ownership forms of banks, there are no differences in such behaviour between commercial and savings banks (i.e. the parameter of *NOI* times the dummy variable BANK is not significant). The other results in terms of estimated coefficients for the rest of explanatory variables do not change with respect to those of column 1. Results in column 4, when the model is estimated for the period 2000-2004, show that general and specific loan loss provisions are no longer used to smooth earnings by neither of the two forms of bank ownership, commercial or savings banks. Therefore, the practice of income smoothing is not related to the ownership form of the bank or, alternatively, managers of commercial banks, with private shareholders, do not seem more or less interested in smoothing earnings than their counterparts at not-for-profit banks. The costs and benefits of income smoothing, if any, do not seem to vary with the ownership form of the bank even though managers of savings banks are expected to have more discretionary power than mangers of commercial banks.

Maybe the importance of smoothing is not based on the type of bank but on whether the bank is public or private (i.e. quoted in the Stock Exchange or not). After all, some of the theoretical explanations of income smoothing have to do with adverse selection problems between owners/managers and small shareholders of listed firms, as well as with costs of liquidity concerns. The empirical findings are mixed[18]. To test for that, we carry out a similar test as that the one performed for commercial versus savings banks. However, now banks are separated into banks listed in the stock market and banks not listed by means

17. The increase in the value of the estimated coefficients of the credit risk variables is coherent with the fact that when loan loss provisions are not used to manage the income statement, they depend on the credit risk variables with more intensity.

18. Burgstahler, Hail and Leuz (2006) find that European private firms exhibit more earnings management than public ones. Cheng and Warfield (2005) show that the more equity incentives managers have, the more earnings management they carry out. Beatty, Ke and Petroni (2002) find that public banks engage in more earnings management.

of a dummy variable QUOTED, worth 1 if the bank is quoted and 0 otherwise (i.e. non-quoted commercial bank or savings bank).

Column 5 in Table 2 shows that for the period 1988-1999, quoted banks had no different behaviour regarding smoothing than the rest of the other non-quoted banks. There is income smoothing for all banks during the period and the rest of the parameters do not change in sign or degree of signification. The last column in Table 2 shows that for the second period, again, there is no income smoothing and no difference in the behaviour of quoted and non-quoted banks is detected. Thus, the signalling explanation of income smoothing, much more relevant for quoted banks, does not seem to apply.

4.1 Robustness analysis

Table 3 presents additional estimations of basic model (3) to show that Table 2 results are invariant to changes in the way the solvency variable or the capital ratio *CAP* is computed. The first two columns, for the 1988-1999 period, show that conclusions about the use of general and specific loan loss provisions to smooth earnings are not affected when the solvency ratio we use is the tier 1 capital ratio *(CAPT1)* or the capital buffer *(BUFFER)*[19]. More important, the value of the parameter of NOI is very similar to that of the first column of Table 2. Columns 4 and 5 of Table 3 replicate the results for the period 2000-2004 with those alternative measures of the solvency ratio, obtaining similar results to those of Table 2. During the period when the statistical provision is in place general and specific loan loss provisions are set independently of the net operating income of banks. The robustness of the conclusions is also confirmed by the results in columns 3 and 6, obtained excluding the solvency ratio from the list of explanatory variables. Again, we find that Spanish banks have been using general and specific provisions to smooth income during 1989 to 1999, but this practice stops after the introduction of the statistical provision in year 2000.

Although the results are not reported, we estimated an augment specification of equation (3) by including the endogenous variable lagged one period as an additional explanatory variable. As mentioned in section 2, specific provisions evolve in Spain according to a calendar linked to the past due age of the non-performing loans. Therefore, it might be reasonable to expect that today's loan loss provisions will be highly correlated to those of last year and it makes sense to check if the results on income smoothing are affected by the persistence in the provisioning ratio. None of the previous results obtained from Table 2 was altered by the augmented model[20].

Finally, we provide evidence that when loan loss provisions include the statistical provision together with the general and the specific ones, income smoothing can no longer be rejected as one would expect from the way the statistical provision is determined. According to Table 4, the estimated coefficient of NOI is now positive and significant (at the 10% level). That precisely reflects the smoothing mechanism associated to the statistical provision

---

19. Essentially, the capital buffer is the difference between the effective amount of own funds hold by the bank and the minimum requirement over the minimum requirement. A detailed discussion of the calculation of the buffer as well as its determinants is in Ayuso, Pérez and Saurina (2004).

20. As an additional robustness test, we have carried out a simple OLS estimation of the basic model (again not shown for the sake of conciseness). We do believe that the proper way to analyze the panel data we have build up is through GMM techniques [Kang and Sivaramakrishnan (1995) argue in favour of GMM estimators instead of OLS regressions in testing income smoothing]. In fact, OLS results confirm that the regressions in both sub-periods show autocorrelation in the residuals. In any case, even taking into account that autocorrelation, the qualitative results hold as the parameter of the NOI is positive and significant in the first period and positive but not significant in the second one. The problem loan ratio and the GDP growth rate are significant and very similar to the results in Table 2. Thus, even using a OLS technique, the results regarding smoothing do not change.

(i.e. it increases in good times, NOI high, and decreases in bad times, NOI low) since, as seen in the second column of Table 2, the specific plus the general provisions show no sign of smoothing during that period. The same result holds using the tier 1 ratio (second column) and the buffer (third column) as measures of capital or when we include the lagged endogenous variable (not shown). In all these cases the GDPG parameter is not significant, because, as explained in section 2, the introduction of the statistical provision implies, among other considerations, flat total loan loss provision ratios[21].

4.2 Discussion

The empirical analysis makes clear that Spanish banks used specific and general loan loss provisions, the only ones available at that time, to smooth earnings in the period 1988 to 1999. They did so even though Spanish regulation does not include loan loss reserves as part of the regulatory capital and the smoothing practice had higher costs, in terms of lowering regulatory capital, than in other countries where loan loss reserves are part of regulatory capital. Therefore, income smoothing must have some benefits for bank managers, shareholders or both.

The empirical evidence also shows that banks stop using loan loss provisions to smooth income after 1999, when the accounting regulatory authority, Banco de España, introduced a new provision with explicit income smoothing purposes, so that banks complying with the regulation show less variability of profits over time.

The statistical provision is transparent and if bank managers obtained private benefits (at the expense of shareholders and investors) from the old smoothing practices, the incentives to continue using general and specific provisions to smooth income, would be unchanged after year 1999. The reason is that management performance can easily be evaluated now by the same measure of accounting profit than before. So the experiment of introducing a transparent statistical provision allows us to explore the issue of who benefits from income smoothing: managers, shareholders or both. The fact that general and specific loan loss provisions no longer depend on the net operating income after 1999 suggests that bank managers do not pursue hidden objectives when they smooth income and that smoothing can serve efficiency purposes in a world of market frictions. The conclusion is strengthened by the additional evidence that old and new smoothing practices do not show significant differences across banks of different ownership form, commercial for-profit banks and not-for-profit savings banks, and across listed and non-listed banks. The former is consistent with Hunton, Libby and Mazza (2006) of a negative association between transparency and earnings management and, more broadly, with Plantin, Sapra and Shin (2005) assessment of mark to market accounting impact on financial stability.

The statistical provision is not tax-deductible and the benefits of smoothing appear to be the same for banks with shareholders than for banks with no shareholders (i.e. savings banks). This excludes tax and signalling considerations as potential drivers of income smoothing. However, both commercial and savings banks issue debt (senior and subordinated) and, thus, they will be concerned about bankruptcy costs and they will try to lower their cost of capital. Income smoothing is a way to smooth dividends and retained

21. We also performed other robustness tests that are not reported here for the sake of conciseness. Among them, a regression for the complete sample period in order to rule out the possibility that the coefficients of the second sub-sample period could be less robust due to the lower amount of observations due to a shorter time span. In this regression we have allowed for changes in NOI after year 2000. The coefficient of NOI is positive and significant for the whole period, while it becomes negative (and significant) after year 2000. Thus, the main result of the paper holds (i.e. income smoothing declines after the introduction of the statistical provision in year 2000).

earning for a given pay-out ratio (savings banks pay the so-called social dividend from net profits). The evidence found in the paper points towards lowering the cost of capital, Trueman and Titman (1988), as the main benefit behind income smoothing among Spanish banks. Savings banks are not quoted. When we add the rest of private commercial banks and compare them with the remaining quoted commercial banks (i.e. public banks), we do not find differences in earnings management behaviour between both types of banks. This result reinforces the cost of capital argument.

The statistical provision was originated by the concern of the Spanish banking supervisory authority about the cyclical profile of general and specific loan loss provisions. These concerns have been also expressed by others, including Laeven and Majnoni (2003) and Holmstrom and Tirole (2000). If provisions focus only on realised losses, without taking into account expected losses lurking in credit portfolios and waiting for the next recession to show up, then banking fragility might increase. A countercyclical provision, such as the statistical one studied in the paper, based on expected losses or on incurred, at a portfolio level, but not yet individually identified losses (i.e. latent or inherent losses), may be a way to keep at bay the former concerns[22]. Our results in the paper suggest that regulatory concerns about implementing accounting practices that match profits with cyclical patterns of credit risk, can be aligned with those of bank managers who obtain benefits in terms of lower cost of capital from the reduced earning volatility resulting from them.

Finally, the results of the paper pose some puzzle for those theoretical models and empirical explanations of income smoothing based solely on the incentives than the managers might have in hiding their current level of profits. Beyond their desire to protect their tenure and enjoy their rents, Fudenberg and Tirole (1995), it might be also possible that the current accounting framework is too rigid, so that it creates too much volatility (i.e. procyclicality) in profits. Conventional loan loss provisions are governed by specific provisions which are backward looking (i.e. they are set as overdue loans appear). Countercyclical loan loss provisions are more forward looking and, provided that they are properly disclosed, could help to alleviate the hidden-smoothing problem in reporting profits. Probably, both managers and investors would improve. Of course, the evidence that bank managers do not seem to obtain private benefits at the expense of shareholders from income smoothing, does not imply that managers cannot use other earnings management devices to alter accounting profits in an interested way as, for example, in response to compensation packages that incorporate stock options.

22. Jiménez and Saurina (2006) contain a practical proposal, as well as the rational for it. Benston and Wall (2004 and 2005) argue that reported net income may be biased if a bank is experiencing rapid credit growth in loans that might go bad not before several years. In that case, the recognition of some of the interest payments should be deferred until it can be matched against the related credit risk.

5 Conclusion

In this paper we have studied the impact that a change in the regulatory framework of loan loss provisions in Spain (i.e. the introduction of a countercyclical loan loss provision, the so-called statistical provision) has had in banks' managers incentives to smooth income. Given the fact that the statistical provision is an explicit and transparent smoothing mechanism, we are able to run a unique natural experiment in order to test whether bank managers have incentives to distort profit reporting in their own benefit (i.e. to hide profits) or, on the contrary, there are other explanations, based on market imperfections, that make such a smoothing behaviour beneficial also for shareholders and other interested parties.

Using the standard panel data econometric methodology, we find clear evidence of income smoothing through general and specific loan loss provisions among Spanish banks. But that smoothing is only present in the period 1988-1999 when banks did not applied the statistical provision. On the contrary, for the period, 2000-2004, when banks had to set aside the statistical provision (as well as the specific and the general ones), there is no evidence of income smoothing. Therefore, it seems that when banks are offered a transparent smoothing mechanism they stop smoothing profits in a non-transparent way (i.e. setting the desired level of loan loss provisions as a function not only of the credit risk determinants but also of long term profit targets).

Other alternative explanations for smoothing (such as tax reasons, signalling for quoted versus non-quoted banks, differences between shareholders controlled banks or managers controlled savings banks) are also rejected by the data. The remaining explanation would be that asymmetries of information between bank managers and investors produce an increase the cost of capital and an increase of the probability of default for banks, Trueman and Titman (1988). In order to mitigate such cost increases bank managers are inclined to use earnings smoothing devices, either transparent if available (such as the statistical provision) or more hidden (as the previous specific and general loan loss provisions).

All in all, maybe managers have no intrinsic will to hide excess volatility in their profit and loss accounts. Rather, they do it in a non-transparent way because there is no mechanism to do it transparently. Once such mechanism is in place, banks stop smoothing income in an opaque way. Again, this enhances the value of accounting disclosure and opens the debate about countercyclical loan loss provisions and, more broadly, on the impact of mark-to-market on financial stability [Plantin, Sapra and Shin (2005)].

REFERENCES

AHMED, A. S., C. TAKEDA and S. THOMAS (1999). "Bank Loan Loss Provisions: a Re-examination of Capital Management, Earnings Management and Signalling Effects", *Journal of Accounting and Economics,* 28, pp. 1-25.

ARELLANO, M., and S. BOND (1988). *Dynamic Panel Data Estimation Using DPD- A Guide for Users,* Working Paper, 88/15, The Institute for Fiscal Studies.

— (1991). "Some Test of Specification for Panel Data: Monte Carlo Evidence and Application to Employment Equations", *Review of Economic Studies,* 58, pp. 277-297.

AYUSO, J., D. PÉREZ and J. SAURINA (2004). "Are Capital Buffers Procyclical? Evidence from Spanish Panel Data", *Journal of Financial Intermediation*, Vol. 13, No. 2. Special Issue on Bank Capital Adequacy Regulation under the New Basel Accord.

BALL, R., S. P. KOTHARI and A. ROBIN (2000). "The effect of international institutional factors on properties of accounting earnings", *Journal of Accounting and Economics,* 29, pp. 1-51.

BANNISTER, J. W., and H. A. NEWMAN (1996). "Accrual usage to manage earnings towards financial forecasts", *Review of Quantitative Finance and Accounting,* 7, pp. 259-278.

BARNEA, A., J. RONEN and S. SADAN (1975). "The implementation of accounting objectives: an application to extraordinary items", *The Accounting Review,* 50, January, pp. 58-68.

BEATTIE, V. A., P. D. CASSON, R. S. DALE, G. W. MCKENZIE, C. M. S. SUTCLIFFE and M. J. TURNER (1995). *Banks and Bad Debts: Accounting for International Losses in International Banking,* John Wiley & Sons.

BEATTY, A., S. L. CHAMBERLAIN and J. MAGLIOLO (1995). "Managing Financial Reports of Commercial Banks: The Influence of Taxes, Regulatory Capital, and Earnings", *Journal of Accounting Research,* Vol. 33, No. 2, Autumn, pp. 231-261.

BEATTY, A., B. KE and K. R. PETRONI (2002). "Earnings Management to Avoid Earnings Declines across Publicly and Privately Held Banks", *The Accounting Review,* 77, 3, July, pp. 547-570.

BEAVER, W. H., C. EGER, S. RYAN and M. WOLFSON (1989). "Financial reporting, supplemental disclosures and bank share price", *Journal of Accounting Research,* 27, Autumn, pp. 157-178.

BEAVER, W. H., and E. E. ENGLE (1996). "Discretionary behaviour with respect to allowance for loan losses and the behaviour of securities prices", *Journal of Accounting and Economics,* 22, August-December, pp. 177-206.

BENSTON, G. J., and L. D. WALL (2004). "How should banks account for loan losses?", *Journal of Accounting and Public Policy,* March-April.

— (2005). "How should banks account for loan losses?", *Economic Review,* Fourth Quarter, Federal Reserve Bank of Atlanta.

BERGSTRESSER, D., and T. PHILIPPON (2006). "CEO incentives and earnings management", *Journal of Financial Economics,* 80, pp. 511-529.

BURGSTAHLER, D., and I. DICHEV (1997). "Earnings management to avoid earnings decreases and losses", *Journal of Accounting and Economics,* 24, pp. 99-126.

BURGSTAHLER, D., L. HAIL and C. Leuz (2006). "The Importance of Reporting Incentives: Earnings Management in European Private and Public Firms", *The Accounting Review,* 81, 5, October, pp. 983-1016.

CHENG, Q., and T. D. WARFIELD (2005). "Equity Incentives and Earnings Management", *The Accounting Review,* 80, 2, April, pp. 441-476.

COLLINS, J. H., D. A. SHACKELFORD and J. M. WAHLEN (1995). "Bank Differences in the Co-ordination of Regulatory Capital, Earnings, and Taxes", *Journal of Accounting Research*, Vol. 33, No. 2, Autumn, pp. 263-291.

CROCKETT, A. (1997). "The Theory and Practice of Financial Stability", *Essays in International Finance,* 203, April. Princeton University.

FERNÁNDEZ DE LIS, S., J. MARTÍNEZ and J. SAURINA (2001). "Credit growth, problem loans and credit risk provisioning in Spain", included in *Marrying the macro- and micro aspects of financial stability,* BIS Papers, No. 1, pp. 331-353.

FUDENBERG, D., and J. TIROLE (1995). "A Theory of Income and Dividend Smoothing Based on Incumbency Rents", *Journal of Political Economy,* Vol. 103, No. 1, pp. 75-93.

GOEL, A. M., and A. V. THAKOR (2003). "Why do firms smooth earnings?", *Journal of Business,* Vol. 76, No. 1, pp. 151-192.

GREENAWALT, M. B., and J. SINKEY (1988). "Bank Loan-Loss Provisions and the Income-Smoothing Hypothesis: An Empirical Analysis, 1976-1984", *Journal of Financial Services Research,* 1, pp. 301-318.

HEALY, P. (1985). "The effect of bonus schemes on accounting decisions", *Journal of Accounting and Economics,* 7, pp. 85-107.

HOLMSTROM, B., and J. Tirole (2000). "Liquidity and risk management", *Journal of Money, Credit and Banking,* 32, pp. 295-319.

HUNTON, J. E., R. LIBBY and C. L. MAZZA (2006). "Financial Reporting Transparency and Earnings Management", *The Accounting Review,* 81, 1, January, pp. 135-157.

JIMÉNEZ, G., and J. SAURINA (2006). "Credit risk, credit cycles and prudential regulation", *International Journal of Central Banking,* Vol. 2, No. 2, June, pp. 65-98.

KANG, S., and K. SIVARAMAKRISHNAN (1995). "Issues in testing earnings management and an instrumental variable approach", *Journal of Accounting Research,* Vol. 33, No. 2, Autumn, pp. 353-367.

KIM, M., and W. KROSS (1998). "The impact of the 1989 change in bank capital standards on loan loss provisions and write-offs", *Journal of Accounting and Economics,* 25, February, pp. 69-99.

LAEVEN, L., and G. MAJNONI (2003). "Loan Loss Provisioning and Economic Slowdowns: Too Much, Too Late?, *Journal of Financial Intermediation,* 12, pp. 178-197.

LAMBERT, R. A. (1984). "Income Smoothing as Rational Equilibrium Behavior", *The Accounting Review,* Vol. LIX, No. 4, October, pp. 604-618.
LIU, C., and S. G. RYAN (2006). "Income Smoothing over the Business Cycle: Changes in Banks' Coordinated Management of Provisions for Loan Losses and Loan Charge-Offs from the Pre-1990 Bust to the 1990s Boom", *The Accounting Review,* 81, 2, March, pp. 421-441.
LIU, C., S. G. RYAN and J. M. WAHLEN (1997). "Differential valuation implications of loan loss provisions across banks and fiscal quarters", *The Accounting Review*, Vol. 72, 3, January, 133-146.
MA, C. K. (1988). "Loan Loss Reserves and Income Smoothing: The Experience in the U.S. Banking Industry", *Journal of Business Finance & Accounting*, 15 (4), Winter, 487-497.
MANOVE, M., and A. J. PADILLA (1999). "Banking (Conservatively) with Optimists", *Rand Journal of Economics* Vol. 30, No. 2, Summer, pp. 324-350.
MCVAY, S. E. (2006). "Earnings Management Using Classification Shifting: An Examination of Core Earnings and Special Items", *The Accounting Review,* 81, 3, May, pp. 501-531.
MOYER, S. E. (1990). "Capital Adequacy ratio Regulations and Accounting Choices in Commercial Banks", *Journal of Accounting and Economics,* 13, pp. 123-154.
PLANTIN, G., H. SAPRA and H. S. SHIN (2005). "Marking to Market, Liquidity, and Financial Stability", *Monetary and Economic Studies, Institute for Monetary and Economic Studies,* Bank of Japan, Vol. 23 (S1), October, pp. 133-155.
RAJAN, R. G. (1994). "Why Bank Credit Policies Fluctuate: a Theory and Some Evidence", *Quarterly Journal of Economics,* Vol. CIX, No. 2, May, pp. 399-441.
ROZYCKI, J. J. (1997). "A tax motivation for smoothing earnings", *Quarterly Review of Economics and Finance,* 37, pp. 563-578.
SAURINA, J. (2009a). "Dynamic Provisioning. The experience of Spain", *Crisis Response. Public Policy for the Private Sector,* Note Number 7, July, The World Bank.
—(2009b). "Loan loss provisions in Spain. A working macroprudential tool", *Estabilidad Financiera,* No. 17, Banco de España, pp. 11-26.
SCHOLES, M. S., G. P. WILSON and M. A. Wolfson (1990). "Tax planning, regulatory capital planning, and financial reporting strategy for commercial banks", *The Review of Financial Studies,* Vol. 3, 4, pp. 625-650.
SUBRAMANYAM, K. R. (1996). "The pricing of discretionary accruals", *Journal of Accounting and Economics,* 22, pp. 250-281.
TAYLOR, A., and C. A. E. GOODHART (2004). *Procyclicality and volatility in the financial system: The implementation of Basel II and IAS 39,* mimeo.
TRUEMAN, B., and B. TITMAN (1988). "An Explanation of Accounting Income Smoothing", *Journal of Accounting Research,* Vol. 26, Supplement, pp. 127-139.
WAHLEN, J, M. (1994). "The Nature of Information in Commercial Bank Loan Loss Disclosures", *The Accounting Review,* Vol. 69, No. 3, July, pp. 455-478.
WALL, L., and T. W. KOCH (2000). "Bank Loan-Loss Accounting: a Review of Theoretical and Empirical Evidence", *Economic Review*, Second Quarter, Federal Reserve Bank of Atlanta, pp. 1-19.
WETMORE, J. L., and J. R. BRICK (1994). "Loan-Loss Provisions of Commercial Banks and Adequate Disclosure: A Note", *Journal of Economics and Business,* 46, pp. 299-305.
WORLD BANK (2002). "Bank Loan Classification and Provisioning Practices in Selected Developed and Emerging Countries", *Finance Forum,* June.

Appendix 1. The workings of the statistical provision

Following Fernádez de Lis, Martínez and Saurina (2001), we can model the statistical provision as follows. The old system is the one previous to the introduction of the statistical provision. The new system is the one for the period 2000-2004 when the statistical provision is added to the specific and the general ones.

Old system

For the General provision the Allowance is $GF = g^*L$, where L stands for total loans and g for the parameter (between 0.5% and 1%), while the annual provision is $GP = g^*\Delta L$. For the Specific provision, the allowance is $SF = e^*M$, where M stands for problem loans and e for the parameter (between 10% and 100%), while the annual provision is $SP = e^*\Delta M$. Thus, the annual total provision in the old system (general + specific) is: $AP = GP + SP = g^*\Delta L + e^*\Delta M$.

New system

The General and Specific provisions are set aside as before. For the Statistical provision there is a Latent risk measure: $Lr = s^*L$, where s stands for the average expected loss (between 0% and 1.5%, depending on the risk bucket considered). The annual provision is $StP = Lr - SP$. If $SP < Lr$ (low problem loans), then $StP > 0$ (building up of the statistical allowance). If, on the contrary, $SP > Lr$ (high problem loans), then $StP < 0$ (depletion of the statistical allowance). The statistical fund allowance is calculated: $StF = StP_t + StF_{t-1}$, with a limit: $0 < StF < 3^*Lr$. Therefore, the annual total provision in the new system (generic + specific + statistical), assuming that limits are not reached is:

$$AP = GP + SP + StP = g^*\Delta L + SP + (Lr - SP) = g^*\Delta L + s^*L$$

The statistical provision it is expected to have a counterbalancing effect on the strong cyclical behaviour of loan loss provisions in Spain. The statistical provision increases precisely during the expansionary phase. During recessions the specific provisions increase while the use of the statistical allowance smoothes its impact on the profit and loss account of the bank.

Chart A.1 shows the impact of the old and new system of provisions. Under the old system the joint effect of the specific plus the general provisions was strongly cyclical. The introduction of the statistical provision has a counterbalancing effect as it has the opposite cycle profile. The joint effect of the old system plus the statistical provision is to smooth provisions during the cycle. As shown in Chart A.2, the statistical allowance is built up during the expansionary period (low problem loans) and decreases in the downturn[23].

Chart A.1 and A.2 allow us to illustrate the impact of the statistical provision over the business cycle. Credit grows strongly during the first two years and loan losses are very low (as well as specific provisions). From the third year a relatively abrupt economic landing starts, with an increase in problem loans and, subsequently, in specific provisions.

23. Charts A.1 and A.2, taken from Fernández de Lis, Martínez and Saurina (2001), are based on the simulation exercise.

The statistical allowance is built up during the first four years as long as the statistical provision is above the specific one. As soon as the specific provision requirements outpace the statistical ones (year 5), the statistical fund is depleted reaching its lowest level in year 8 when it is almost exhausted. From year 9 onwards, the build-up resumes as the cyclical position of the economy improves.

Chart A.1 . Impact of the old and the new system (over total loans)

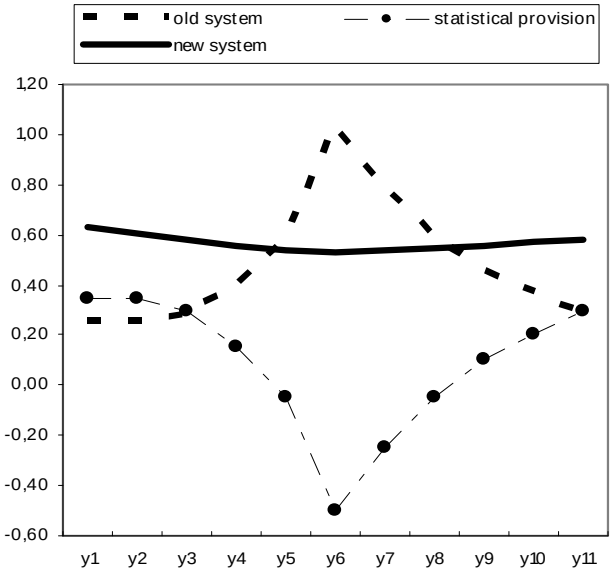


Chart A.2. Statistical allowance (over total fund)

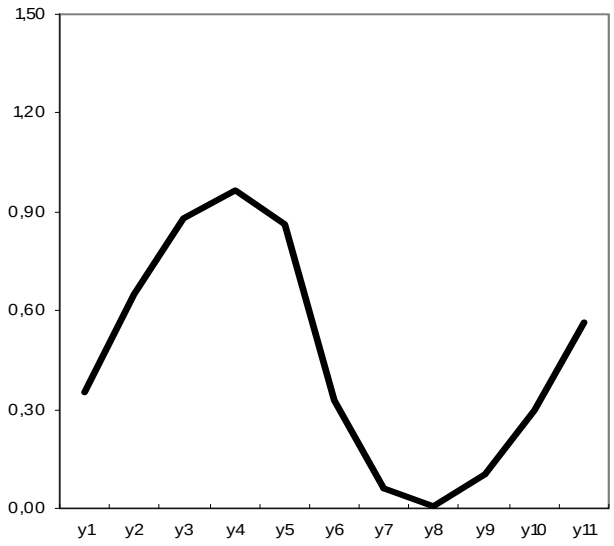


Table 1. Summary statistics and definition of the variables used in the empirical analysis

Sample period: 1988-2004 (annual data). Sample size: 1374 observations.

TCLLP: ratio of total net specific, general and statistical loan loss provisions over total assets. ***CLLP***: ratio of total net specific and general loan loss provisions over total assets. ***NPL***: ratio of doubtful assets over total assets. ***IBOL***: general index of the Madrid Stock Exchange. ***LTA***: ratio of total loans over total assets. ***GDPG***: real GDP growth. ***CAP***: total capital ratio (regulatory capital over risk-weighted assets). ***CAPT1***: Tier 1 ratio (Tier 1 capital over risk-weighted assets). ***BUFFER***: capital buffer (the relative excess of capital hold by the bank over the minimum regulatory requirements). ***NOI***: ratio of net income before provisions, extraordinary items and taxes over total assets. ***SIZE***: log of total assets.

	Mean	Standard Deviation	Minimum	Maximum
TCLLP	0.44	0.39	-1.12	3.56
CLLP	0.40	0.41	-1.12	3.56
NPL	1.87	1.49	0.00	12.62
IBOL	518	282	214	1012
LTA	55.29	13.47	10.98	98.95
GDPG	3.08	1.51	-1.03	5.10
CAP	11.41	2.94	1.87	27.21
CAPT1	9.97	3.23	1.30	27.21
BUFFER	42.66	36.72	-76.60	240.10
NOI	1.38	0.78	-4.77	4.45
SIZE	14.76	1.58	10.32	20.20

Table 2. Estimation of the model of determinants of loan loss provisions charged by Spanish banks: Basic model

Dependent variable: CLLP, the ratio of total net specific and general loan loss provisions over total assets. Estimation method: GMM, equation in first differences. Columns 1, 3 and 5 correspond to the period 1988-1999; columns 2, 4 and 6 to the period 2000-2004. Columns 3 and 4 (5 and 6) allow for differences in smoothing across banks of different ownership (listed and unlisted). NPL: ratio of doubtful assets over total assets. IBOL: general index of the Madrid Stock Exchange. LTA: ratio of total loans over total assets. GDPG: real GDP growth. CAP: total capital ratio (regulatory capital over risk-weighted assets). NOI: ratio of net income before provisions, extraordinary items and taxes over total assets. SIZE: log of total assets. BANK: a dummy variable worth 1 if the bank is commercial, 0 otherwise. QUOTED: a dummy variable worth 1 if the bank is quoted, 0 otherwise.

Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
NPL_{it}	0.115***	0.236***	0.115***	0.193**	0.121***	0.234***
	(0.000)	(0.007)	(0.000)	(0.024)	(0.000)	(0.009)
$IBOL_{it}$	-0.000**	-0.000	-0.000***	0.000	-0.000*	0.000
	(0.012)	(0.366)	(0.009)	(0.387)	(0.056)	(0.384)
LTA_{it}	0.013***	-0.002	0.015***	-0.002	0.011***	-0.001
	(0.001)	(0.644)	(0.000)	(0.511)	(0.004)	(0.736)
$GDPG_t$	-0.044**	-0.053*	-0.047***	-0.054*	-0.045**	-0.056**
	(0.015)	(0.059)	(0.008)	(0.057)	(0.012)	(0.048)
CAP_{it-1}	-0.012	0.003	-0.004	0.000	-0.013	0.004
	(0.309)	(0.702)	(0.729)	(0.948)	(0.257)	(0.615)
NOI_{it}	0.148***	0.016	0.128**	0.057	0.116**	0.025
	(0.007)	(0.857)	(0.035)	(0.627)	(0.037)	(0.783)
$BANK*NOI_t$	--	--	-0.036	-0.036	--	--
	--	--	(0.704)	(0.763)	--	--
$QUOTED*NOI_t$	--	--	--	--	0.039	-0.237
	--	--	--	--	(0.646)	(0.401)
$SIZE_{it}$	0.018	0.043	-0.016	0.053	-0.018	0.037
	(0.830)	(0.516)	(0.834)	(0.453)	(0.831)	(0.609)
m1	-3.391***	-3.652***	-3.354***	-3.666***	-3.471***	-3.603***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
m2	-1.428	0.391	-1.314	0.456	-1.376	0.377
	(0.153)	(0.696)	(0.189)	(0.648)	(0.169)	(0.706)
Sargan test	95.33	38.36	116.46	49.08	105.61	42.58
	(0.278)	(0.363)	(0.319)	(0.313)	(0.306)	(0.361)
Period	1988-1999	2000-2004	1988-1999	2000-2004	1988-1999	2000-2004
Nº Obs.	959	332	959	332	959	332

m1 and m2 stand for first- and second-order residual autocorrelation, based on estimates of the residuals in first differences. *IBOL*, *GDPG* and *SIZE,* are considered exogenous. Instruments for the endogenous variables: GMM with lags 2 to 3 for *NPL*, *LTA, CAP and NOI. In columns 3 and 4 BANK*NOI lag 2 and in columns 5 and 6 lag 2.* All instruments selected as in DPD (Arellano and Bond (1991)). ***, ** and * denote significance at 1%, 5% and 10%, respectively. P-values in brackets.

Table 3. Estimation of the model of determinants of loan loss provisions charged by Spanish banks: Robustness analysis for different definitions of regulatory capital

Dependent variable: CLLP, the ratio of total net specific and general loan loss provisions over total assets. Estimation method: GMM, equation in first differences. NPL: ratio of doubtful assets over total assets. IBOL: general index of the Madrid Stock Exchange. LTA: ratio of total loans over total assets. GDPG: real GDP growth. CAP: total capital ratio (regulatory capital over risk-weighted assets). CAPT1: Tier 1 ratio (Tier 1 capital over risk-weighted assets). BUFFER: capital buffer (the relative excess of capital hold by the bank over the minimum regulatory requirements). NOI: ratio of net income before provisions, extraordinary items and taxes over total assets. SIZE: log of total assets.

Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
NPL_{it}	0.117***	0.114***	0.121***	0.241***	0.228***	0.213**
	(0.000)	(0.000)	(0.000)	(0.009)	(0.008)	(0.013)
$IBOL_{it}$	-0.000**	-0.000**	-0.000**	0.000	0.000	0.000
	(0.011)	(0.014)	(0.014)	(0.304)	(0.312)	(0.344)
LTA_{it}	0.014***	0.013***	0.013***	-0.001	-0.000	-0.000
	(0.000)	(0.001)	(0.000)	(0.740)	(0.886)	(0.900)
$GDPG_{t}$	-0.043**	-0.044**	-0.047***	-0.055*	-0.053*	-0.052*
	(0.014)	(0.018)	(0.008)	(0.052)	(0.063)	(0.073)
$CAPT1_{it-1}$	-0.011	--	--	0.002	--	--
	(0.367)	--	--	(0.847)	--	--
$BUFFER_{it-1}$	--	-0.001	--	--	-0.000	--
	--	(0.224)	--	--	(0.807)	--
NOI_{it}	0.150***	0.148**	0.131**	0.001	0.023	0.044
	(0.007)	(0.012)	(0.024)	(0.991)	(0.786)	(0.599)
$SIZE_{it}$	0.018	0.021	-0.009	0.025	0.012	0.017
	(0.834)	(0.809)	(0.917)	(0.702)	(0.856)	(0.799)
m1	-3.370***	-3.423***	-3.335***	-3.584***	-3.663***	-3.669***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
m2	-1.422	-1.453	-1.368	0.375	0.370	0.391
	(0.155)	(0.146)	(0.171)	(0.708)	(0.711)	(0.696)
Sargan test	93.64	93.99	105.22	37.82	39.73	31.54
	(0.320)	(0.311)	(0.244)	(0.386)	(0.308)	(0.249)
Period	1988-1999	1988-1999	1988-1999	2000-2004	2000-2004	2000-2004
Nº Obs.	959	959	959	332	332	332

m1 and m2 stand for first- and second-order residual autocorrelation, based on estimates of the residuals in first differences. *IBOL*, *GDPG* and *SIZE,* are considered exogenous. Instruments for the endogenous variables: GMM with lags 2 to 3 for *NPL*, *LTA, CAP, CAPT1, BUFFER and NOI, In columns 3 and 6, lags 2 to 4 are used.* All instruments selected as in DPD (Arellano and Bond (1991)). ***, ** and * denote significance at 1%, 5% and 10%, respectively. P-values in brackets.

Table 4. Estimation of the model of determinants of loan loss provisions charged by Spanish banks: Total loan loss provisions (general, specific and statistical).

Dependent variable: TCLLP, the ratio of total net specific, general and statistical loan loss provisions over total assets. Estimation method: GMM, equation in first differences. NPL: ratio of doubtful assets over total assets. IBOL: general index of the Madrid Stock Exchange. LTA: ratio of total loans over total assets. GDPG: real GDP growth. CAP: total capital ratio (regulatory capital over risk-weighted assets). CAPT1: Tier 1 ratio (Tier 1 capital over risk-weighted assets). BUFFER: capital buffer (the relative excess of capital hold by the bank over the minimum regulatory requirements). NOI: ratio of net income before provisions, extraordinary items and taxes over total assets. SIZE: log of total assets.

Explanatory variables	Column 1	Column 2	Column 3
NPL_{it}	0.133**	0.114*	0.131*
	(0.049)	(0.084)	(0.052)
$IBOL_{it}$	-0.000***	-0.000***	-0.000***
	(0.001)	(0.001)	(0.001)
LTA_{it}	0.002	0.002	0.003
	(0.611)	(0.404)	(0.287)
$GDPG_{t}$	0.002	0.005	0.003
	(0.885)	(0.758)	(0.873)
CAP_{it-1}	-0.006	--	--
	(0.404)	--	--
$CAPT1_{it-1}$	--	-0.011	--
	--	(0.271)	--
$BUFFER_{it-1}$	--	--	-0.000
	--	--	(0.349)
NOI_{it}	0.118*	0.139**	0.121*
	(0.083)	(0.043)	(0.075)
$SIZE_{it}$	0.279***	0.243***	0.244***
	(0.001)	(0.002)	(0.006)
m1	-3.469***	-3.521***	-3.490***
	(0.000)	(0.000)	(0.000)
m2	-1.295	-1.300	-1.319
	(0.195)	(0.194)	(0.187)
Sargan test	62.39	60.66	62.99
	(0.153)	(0.192)	(0.141)
Period	2000-2004	2000-2004	2000-2004
Nº Obs.	332	332	332

m1 and m2 stand for first- and second-order residual autocorrelation, based on estimates of the residuals in first differences. *IBOL*, *GDPG* and *SIZE,* are considered exogenous. Instruments for the endogenous variables: GMM with lags 2 to 3 for *NPL*, *LTA, CAP, CAPT1 and BUFFER.*. All instruments selected as in DPD (Arellano and Bond (1991)). ***, ** and * denote significance at 1%, 5% and 10%, respectively. P-values in brackets.

BANCO DE ESPAÑA PUBLICATIONS

WORKING PAPERS[1]

1001 JAVIER ANDRÉS, ÓSCAR ARCE AND CARLOS THOMAS: Banking competition, collateral constraints and optimal monetary policy.
1002 CRISTINA BARCELÓ AND ERNESTO VILLANUEVA: The response of household wealth to the risk of losing the job: evidence from differences in firing costs.
1003 ALEXANDER KARAIVANOV, SONIA RUANO, JESÚS SAURINA AND ROBERT TOWNSEND: No bank, one bank, several banks: does it matter for investment?
1004 GABRIEL PEREZ-QUIROS AND HUGO RODRÍGUEZ MENDIZÁBAL: Asymmetric standing facilities: an unexploited monetary policy tool.
1005 GABRIEL JIMÉNEZ, JOSE A. LOPEZ AND JESÚS SAURINA: How does competition impact bank risk-taking?
1006 GIUSEPPE BERTOLA, AURELIJUS DABUSINSKAS, MARCO HOEBERICHTS, MARIO IZQUIERDO, CLAUDIA KWAPIL, JEREMI MONTORNÈS AND DANIEL RADOWSKI: Price, wage and employment response to shocks: evidence from the WDN Survey.
1007 JAVIER MENCÍA: Testing non-linear dependence in the Hedge Fund industry.
1008 ALFREDO MARTÍN-OLIVER: From proximity to distant banking: Spanish banks in the EMU.
1009 GALO NUÑO: Optimal research and development expenditure: a general equilibrium approach.
1010 LUIS J. ÁLVAREZ AND PABLO BURRIEL: Is a Calvo price setting model consistent with micro price data?
1011 JENS HAGENDORFF, IGNACIO HERNANDO, MARÍA J. NIETO AND LARRY D. WALL: What do premiums paid for bank M&As reflect? The case of the European Union.
1012 DAVID DE ANTONIO LIEDO: General equilibrium restrictions for dynamic factor models.
1013 JAMES COSTAIN, JUAN F. JIMENO AND CARLOS THOMAS: Employment fluctuations in a dual labor market.
1014 LUIS M. VICEIRA AND RICARDO GIMENO: The euro as a reserve currency for global investors.
1015 PALOMA LÓPEZ-GARCÍA AND JOSÉ MANUEL MONTERO: Understanding the Spanish business innovation gap: The role of spillovers and firms' absorptive capacity.
1016 AITOR LACUESTA AND SERGIO PUENTE: El efecto del ciclo económico en las entradas y salidas de inmigrantes en España.
1017 REBEKKA CHRISTOPOULOU, JUAN F. JIMENO AND ANA LAMO: Changes in the wage structure in EU countries.
1018 THOMAS BREUER, MARTIN JANDAČKA, JAVIER MENCÍA AND MARTIN SUMMER: A systematic approach to multi-period stress testing of portfolio credit risk.
1019 LUIS J. ÁLVAREZ AND PABLO BURRIEL: Micro-based estimates of heterogeneous pricing rules: The United States vs. the euro area.
1020 ALFREDO MARTÍN-OLIVER AND VICENTE SALAS-FUMÁS: I.T. investment and intangibles: Evidence from banks.
1021 LUISA LAMBERTINI, CATERINA MENDICINO AND MARIA TERESA PUNZI: Expectations-driven cycles in the housing market.
1022 JULIÁN MESSINA, PHILIP DU CAJU, CLÁUDIA FILIPA DUARTE, NIELS LYNGGÅRD HANSEN AND MARIO IZQUIERDO: The incidence of nominal and real wage rigidity: an individual-based sectoral approach.
1023 ALESSIO MORO: Development, growth and volatility.
1024 LUIS J. ÁLVAREZ AND ALBERTO CABRERO: Does housing really lead the business cycle?
1025 JUAN S. MORA-SANGUINETTI: Is judicial inefficiency increasing the house property market weight in Spain? Evidence at the local level.
1026 MAXIMO CAMACHO, GABRIEL PEREZ-QUIROS AND PILAR PONCELA: Green shoots in the Euro area. A real time measure.
1027 AITOR ERCE AND JAVIER DÍAZ-CASSOU: Creditor discrimination during sovereign debt restructurings.
1028 RAFAEL REPULLO, JESÚS SAURINA AND CARLOS TRUCHARTE: Mitigating the pro-cyclicality of Basel II.
1029 ISABEL ARGIMÓN AND JENIFER RUIZ: The effects of national discretions on banks.
1030 GABRIEL JIMÉNEZ, STEVEN ONGENA, JOSÉ-LUIS PEYDRÓ AND JESÚS SAURINA: Credit supply: identifying balance-sheet channels with loan applications and granted loans.
1031 ENRIQUE MORAL-BENITO: Determinants of economic growth: A Bayesian panel data approach.

---

1. Previously published Working Papers are listed in the Banco de España publications catalogue.

1032 GABE J. DE BONDT, TUOMAS A. PELTONEN AND DANIEL SANTABÁRBARA: Booms and busts in China's stock market: Estimates based on fundamentals.

1033 CARMEN MARTÍNEZ-CARRASCAL AND JULIAN VON LANDESBERGER: Explaining the demand for money by non-financial corporations in the euro area: A macro and a micro view.

1034 CARMEN MARTÍNEZ-CARRASCAL: Cash holdings, firm size and access to external finance. Evidence for the euro area.

1035 CÉSAR ALONSO-BORREGO: Firm behavior, market deregulation and productivity in Spain.

1036 OLYMPIA BOVER: Housing purchases and the dynamics of housing wealth.

1037 DAVID DE ANTONIO LIEDO AND ELENA FERNÁNDEZ MUÑOZ: Nowcasting Spanish GDP growth in real time: "One and a half months earlier".

1038 FRANCESCA VIANI: International financial flows, real exchange rates and cross-border insurance.

1039 FERNANDO BRONER, TATIANA DIDIER, AITOR ERCE AND SERGIO L. SCHMUKLER: Gross capital flows: dynamics and crises.

1101 GIACOMO MASIER AND ERNESTO VILLANUEVA: Consumption and initial mortgage conditions: evidence from survey data.

1102 PABLO HERNÁNDEZ DE COS AND ENRIQUE MORAL-BENITO: Endogenous fiscal consolidations.

1103 CÉSAR CALDERÓN, ENRIQUE MORAL-BENITO AND LUIS SERVÉN: Is infrastructure capital productive? A dynamic heterogeneous approach.

1104 MICHAEL DANQUAH, ENRIQUE MORAL-BENITO AND BAZOUMANA OUATTARA: TFP growth and its determinants: nonparametrics and model averaging.

1105 JUAN CARLOS BERGANZA AND CARMEN BROTO: Flexible inflation targets, forex interventions and exchange rate volatility in emerging countries.

1106 FRANCISCO DE CASTRO, JAVIER J. PÉREZ AND MARTA RODRÍGUEZ VIVES: Fiscal data revisions in Europe.

1107 ANGEL GAVILÁN, PABLO HERNÁNDEZ DE COS, JUAN F. JIMENO AND JUAN A. ROJAS: Fiscal policy, structural reforms and external imbalances: a quantitative evaluation for Spain.

1108 EVA ORTEGA, MARGARITA RUBIO AND CARLOS THOMAS: House purchase versus rental in Spain.

1109 ENRIQUE MORAL-BENITO: Dynamic panels with predetermined regressors: likelihood-based estimation and Bayesian averaging with an application to cross-country growth.

1110 NIKOLAI STÄHLER AND CARLOS THOMAS: FiMod – a DSGE model for fiscal policy simulations.

1111 ÁLVARO CARTEA AND JOSÉ PENALVA: Where is the value in high frequency trading?

1112 FILIPA SÁ AND FRANCESCA VIANI: Shifts in portfolio preferences of international investors: an application to sovereign wealth funds.

1113 REBECA ANGUREN MARTÍN: Credit cycles: Evidence based on a non-linear model for developed countries.

1114 LAURA HOSPIDO: Estimating non-linear models with multiple fixed effects: A computational note.

1115 ENRIQUE MORAL-BENITO AND CRISTIAN BARTOLUCCI: Income and democracy: Revisiting the evidence.

1116 AGUSTÍN MARAVALL HERRERO AND DOMINGO PÉREZ CAÑETE: Applying and interpreting model-based seasonal adjustment. The euro-area industrial production series.

1117 JULIO CÁCERES-DELPIANO: Is there a cost associated with an increase in family size beyond child investment? Evidence from developing countries.

1118 DANIEL PÉREZ, VICENTE SALAS-FUMÁS AND JESÚS SAURINA: Do dynamic provisions reduce income smoothing using loan loss provisions?

BANCO DE **ESPAÑA**
Eurosistema

Unidad de Publicaciones
Alcalá 522, 28027 Madrid
Telephone +34 91 338 6363. Fax +34 91 338 6488
E-mail: publicaciones@bde.es
www.bde.es