

# Do Banks Provision for Bad Loans in Good Times?

## Empirical Evidence and Policy Implications

*Michele Cavallo*  
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The general recognition that bank capital should provide a buffer for “unexpected” losses assumes that “expected” losses are considered in setting loan loss provisions. Failure to provide coherent and internationally accepted regulation of provisions for loan losses reduces the usefulness of minimum capital regulations, especially in emerging economies.



## Summary findings

Recent debate about the pro-cyclical effects of bank capital requirements has ignored the important role that bank loan loss provisions play in the overall framework of minimum capital regulation.

It is frequently observed that underprovisioning, due to inadequate assessment of expected credit losses, aggravates the negative effect of minimum capital requirements during recessions because capital must absorb both expected and unexpected losses. Moreover, when expected losses are properly reflected in lending rates but not in provisioning practices, fluctuations in bank earnings magnify true oscillations in bank profitability.

The relative agency problems faced by different stakeholders may help explain the prevailing and often unsatisfactory institutional arrangements.

Cavallo and Majnoni test their hypotheses with a sample of 1,176 large commercial banks—372 of them in non-G10 countries—for the period 1988–99. After controlling for different country-specific macroeconomic and institutional features, they find robust evidence among G10 banks of a positive association between loan loss provisions and banks' pre-provision income. Such evidence is not confirmed for non-G10 banks, which on average provision too little in good times and are forced to increase provisions in bad times.

The econometric evidence shows that the protection of outsiders' claims—the claims of minority shareholders in common law countries and of fiscal authorities in countries with high public debt—on bank income has negative effects on the level of bank provisions.

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This paper—a product of the Financial Sector Strategy and Policy Department—is part of a larger effort in the department to study the impact of financial regulation on economic development. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Elena Mekhova, room MC9-622, telephone 202-458-5986, fax 202-522-2031, email address [emekhova@worldbank.org](mailto:emekhova@worldbank.org). Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The authors may be contacted at [mc399@is.nyu.edu](mailto:mc399@is.nyu.edu) or [gmajnoni@worldbank.org](mailto:gmajnoni@worldbank.org). June 2001. (27 pages)

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## **Empirical Evidence and Policy Implications**

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## 1. Introduction<sup>1</sup>

Pro-cyclical effects of risk-based capital have been a relevant element of concern in the ongoing debate about new bank capital requirements. The deterioration of banks' asset quality during cyclical downturns, in fact, requires higher provisions and may drive capital below minimum requirements exactly when capital is more expensive or simply unavailable for weaker institutions. When capital shortages are faced by banks accounting for a large share of total lending to the economy the resulting credit contraction may have systemic implications<sup>2</sup>.

This paper suggests that cyclical shortages of banks' capital may not only be due to the risk based regulation of bank capital but most prominently to the lack of risk based regulation of banks' loan loss provisioning practices. The blame for pro-cyclical effects associated with capital shortages could therefore shift to some extent from the content of currently proposed capital regulation to its inadequate comprehensiveness.

The generalized recognition that bank capital should provide a buffer to unexpected losses is in fact based on the implicit assumption that expected losses have already been absorbed by properly set loan loss reserves. When, instead, loan loss reserves are inadequate, expected losses will affect banks' capital and the impact of capital shortages on the real economy will be magnified<sup>3</sup>. As a result, for economies where sound provisioning norms are not embedded in bank practices - as it is the case for most emerging economies - the lack of a coherent and internationally accepted regulation of loan loss provisions reduces the usefulness of minimum capital regulation.

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<sup>1</sup> We would like to thank Franklin Allen, Jerry Caprio, Patrick Honohan, Alain Laurin, Rick Mishkin, Larry Promisel and Anthony Santomero for useful discussions and Hosook Hwang for outstanding research assistance. This paper's findings, interpretations, and conclusions are entirely those of the authors and do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent.

<sup>2</sup> Notwithstanding the widespread concerns, expressed also by the Financial Stability Forum, the Basel Committee on Banking Supervision (BCBS) has come to the conclusion "that the proper tool to avoid the negative macroeconomic effects of risk based capital requirements may not be found in the regulation of solvency ratios" and that instead "the supervisory review and market discipline pillars of the Accord" should induce banks to "build up sufficient capital during growth periods" (BCBS, 2000, p.2).

<sup>3</sup> The mixed evidence about the effects of new capital requirements on the real economy in G10 countries has been surveyed in BCBS (1999). Evidence of its significant impact in non-G10 countries is provided by Chiuri et al (2001).

Notwithstanding its relevance, the regulation of banks' loan loss provisions has attracted considerably less attention than that of banks' minimum capital. We claim that the difficulty faced by the regulation of banks' provisioning practices – and therefore its delayed formulation – lies in the presence of agency problems of difficult solution between different classes of banks' stakeholders such as banks' "outsiders" (minority shareholders or the fiscal authority) and banks' "insiders" (bank managers and majority shareholders).

Lacking a well defined and internationally agreed code of conduct, we face a multiplicity of institutional solutions. In several cases the protection of "outsiders" claims to banks' income may be too rigid or too extensive providing a disincentive to adequate loan loss provisioning with negative repercussions on the stability of the banking system.

We test empirically our conjectures over a sample of 1176 banks from 36 countries for the period 1988-1999 and we find that the level of institutional development significantly affects loan loss provisioning practices. More specifically, we find evidence that the positive association between loan loss provisioning and banks' EBTDA does not hold for banks located in non-G10 countries. This result is due to inadequate provisioning in the upswing phase of the cycle which forces these institutions to increase provisions during periods of financial distress, lending support to our suggestion that a capital regulation without sound provisioning rules may have pro-cyclical effects. We also find that a higher level of assertiveness of banks' "outsiders" – such as the fiscal authority and minority shareholders - is negatively related to the amount of loan loss provisions, confirming our conjecture about the incentives structure and the conflict of interests among different banks' stakeholders in the definition of provisioning rules. Overall, our empirical findings suggest that pro-cyclical effects of bank capital regulation can be reduced, and long run stability of the banking system improved, by a regulatory solution which strikes a balance between the conflicting objectives of "outsiders" protection and bank provision enhancement.

The paper is structured as follows. Section 2 draws from the current debate on banks' capital requirements, defines different forms of loan loss provisions and discusses their role. Section 3 illustrates the agency problems raised by the existence of conflicting

claims over banks' income on the part of different stakeholders and the implications on loan loss provisioning. Section 4 illustrates how different provisioning strategies, associated with "outsiders" protection, may affect banks' income smoothing over the cycle. Section 5 describes the econometric test, the nature of the data used and the results of the empirical analysis. Section 6 concludes and discusses some policy implications also with reference to the new proposal for new bank minimum capital requirement of the BCBS.

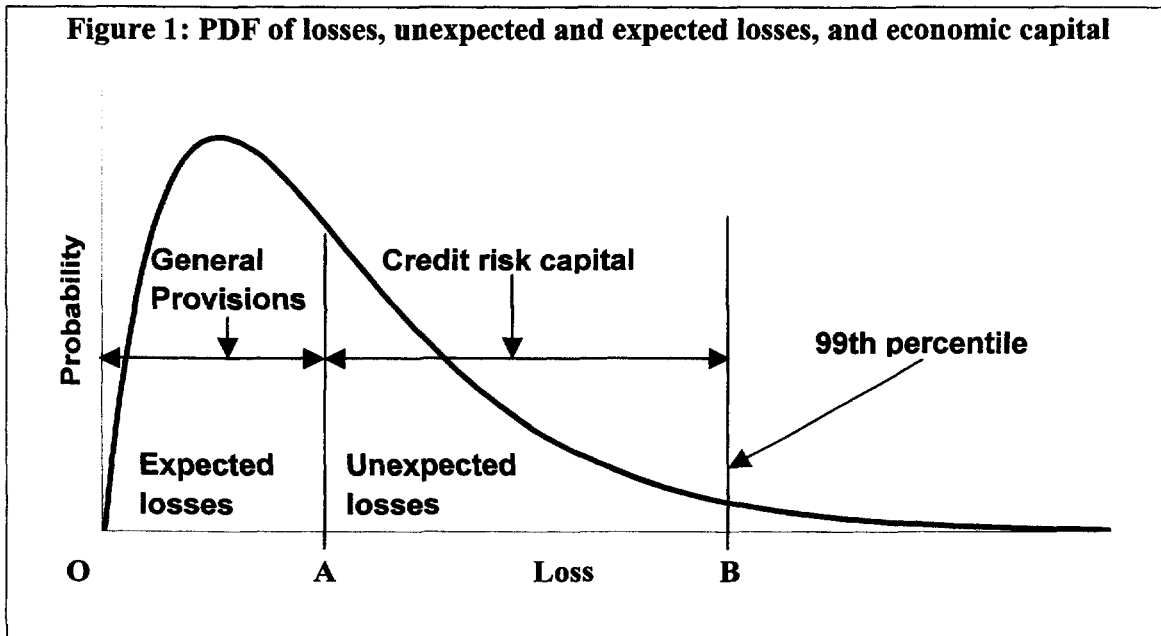
## **2. Provisions and expected losses**

Although regulatory capital is intended to provide an adequate buffer against adverse occurrences to banks' balance sheets it is not the only relevant buffer bankers can resort to. The prevailing conceptual framework, summarized in Figure 1, recognizes the existence of two categories of shock absorbers: loan loss reserves and capital. Regulatory capital should cope with the occurrence of "unexpected losses", that is losses that are large but infrequent and that therefore can be located far in the tail of the frequency distribution of loan losses. Loan loss reserves should, instead, cope with "expected losses", that is losses which occur on average and can be measured by the mean value of the frequency distribution of loan losses. According to this distinction, the occurrence of losses equal to OB in Figure 1 should be buffered for the amount OA by loan loss reserves and for the amount AB by depleting regulatory capital. What Figure 1 makes clear is that the very effectiveness of regulatory capital as a buffer of unexpected shocks rests on the existence of the subsidiary buffer represented by the reserves created through loan loss provisions.

The conceptual distinction between expected and unexpected components of loan losses carries with it several important implications about the distinctive role and functions of bank capital and loan loss reserves in the domain of risk management, of risk measurement and of accounting procedures.

The first immediate consequence is that loan loss provisions cannot be reduced through portfolio diversification. Differently from capital – which is related to measures of dispersion and can be reduced through portfolio diversification - provisions for

individual loans are related to the mean value of the loss distribution and are additive over a portfolio of assets<sup>4</sup>. The same loan will require the same amount of provisions whether it is a part of the vastly diversified portfolio of an internationally active bank or of the concentrated portfolio of a small cooperative bank. While this is not a very exciting property from the standpoint of a risk manager it has some desirable regulatory implications. In fact, it makes it possible to envisage a relatively simple regulatory approach to loan loss provisioning which, unlike capital regulation, needs not differentiate among institutions of different complexity and is not affected by the composition of banks' loan portfolio.



The second implication, of statistical nature, is that provisions can be estimated with greater precision than capital requirements, especially when the amount of information about loan defaults is limited. In fact, the new regulatory approach set out by the BCBS requires that capital be equal to credit losses located at given percentile levels – such as the 1 per cent or the 0.1 per cent – of the highly asymmetric distribution of loan losses. Provisions, instead, should be equal to the mean value of the same distribution.

<sup>4</sup> Consider for instance a portfolio  $y=x_1+x_2$ , where  $x_1$  and  $x_2$  are two assets with the following loss probability distribution  $x_1 \sim (\mu_1, \sigma_1)$  and  $x_2 \sim (\mu_2, \sigma_2)$ . Portfolio's unexpected losses, measured by the standard deviation  $\sigma_y = \sqrt{\sigma_1^2 + \sigma_2^2 + 2\rho\sigma_1\sigma_2}$ , can be reduced as the correlation parameter



The measurement implications of this conceptual approach are relevant. In fact, the standard error of statistical estimates of percentile levels of probability distributions – and the associated level of capital - increases as the distribution becomes more asymmetric and decreases only gradually with the number of available observations<sup>5</sup> (Kupiec, 1995). Sample estimates of expected values of the same distributions enjoy lower standard errors. Measures of provisions are always going to be more precise than measures of capital and their relative precision will increase with asymmetric loan loss distributions and with small sample sizes. The regulatory implications of these statistical facts should not be underestimated. In fact, they suggest that loan loss provisions are simpler and more accurate to measure than banks capital, making “risk based” provisions easier to adopt and to enforce than capital requirements in countries where the volume of credit-related information is relatively low, as in most emerging economies.

The third implication, of accounting nature, is that, lacking a symmetric treatment of expected losses on both sides of the profit and loss account, bank income statements may convey biased notions of bank profitability. For instance, allowing interest premiums (on the asset side) but not general provisions (on the cost side) to be equal to expected losses generates an upward bias of banks’ operating income during cyclical upswings and a downward bias during downswings<sup>6</sup>. The bias is reduced but not eliminated at the level of pre-tax profits, when charges related to loan loss provisions are fully taken into account also on the cost side. The bias, though, persists because in most countries “general” provisions are often subject to quantitative restrictions that keep them smaller than expected losses. In the extreme case where general provisions are equal to zero no charges for provisions will be made in good times and all charges will be posted as specific provisions in bad times.

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goes from +1 a -1. On the contrary, the expected losses, measured by the mean losses of the portfolio  $\mu_y = \mu_1 + \mu_2$ , are not affected by the number of assets in the portfolio and by the correlation in their returns.

<sup>5</sup> In the case of the normal distribution, for which we have simple analytical expressions of the standard deviation of the relevant sample estimates, the standard deviation of the sample mean is equal to  $\sigma n^{-1/2}$  while that of the percentiles is equal to  $k\sigma n^{-1/2}$ , where n defines the sample size and k is approximately equal to 2.13 for the 5% percentile and to 3.77 for the 1% percentile. The ratio of standard deviations of the sample mean over that of a sample percentile increases as distributions become more skewed.

<sup>6</sup> As an example, the European Union Council 86/935 on the annual accounts of banks and other financial institutions which is adopted by all EU member countries does not include provisions, nor specific nor general ones, as a component of operating costs. Since the remuneration for expected losses, represented by

According to widespread accounting practices “general” provisions refer to “ex-ante” provisions and are related to future uncertain events. “Specific” provisions can instead be seen as “ex-post” provisions, in that they refer to *certain* events (such as past due payments, or other default-like events) for which a specific documentation can be produced<sup>7</sup>.

“Specific” provisions are somewhat similar to write-offs and, since they can be easily documented, are not subject to significant restrictions. “General” provisions, instead, refer to probabilistic losses that cannot be supported by loan specific documentation and therefore can be highly judgmental, controversial and prone to manipulation by bank managers for opportunistic reasons or for tax avoidance purposes. Regulatory restrictions on “general” provisions, such as regulatory ceilings, are therefore intended to reduce the amount of possible controversies and litigations among different groups of bank stakeholders. As a result, we observe that accounting restrictions coupled with fiscal restrictions, intended to limit tax deductibility of general loan loss provisions, often prevent loan loss provisions from reaching the level of expected losses.

Not always bank regulations refer explicitly to general or specific provisions but most of the times regulatory requirements can be partitioned among “ex-ante” and “ex-post” provisioning. For instance, provisions triggered by past due payments could be considered as “specific” provisions. They are, in fact, related to an observed event (missing payments) which is one of those considered by the BCBS in its definition of default (BCBS, 2001). Provisions which are, instead, required for all loans, independently from the presence of a default event, can be considered of a “general” nature. More difficult is to draw a line when provisions are based on cash flow considerations, which are by their very nature more forward looking. In this case the distinction needs to be based on a more detailed observation of the loan classification procedure.

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lending rate premia, cannot be netted from operating income, operating profits tend to give an upward biased measure of profitability.

<sup>7</sup> The two categories of provisions follow also different accounting rules. Specific provisions appear as charges in the income statement and generate a “contra assets’ reserve or, as in the EU countries, a reduction of assets in the balance sheet. General provisions, instead, are registered separately in the income statements and generate reserves on the liability side of the balance sheet.

### **3. An agency approach to general loan loss provisions**

If risk weighted provisions are more easily measured than capital and if a proper measurement of loan loss provisions could lead to a more faithful representation of the true underlying bank profitability why are not accounting, fiscal and prudential regulations taking advantage of these features? Our conjecture is that the definition of loan loss provisions is affected by a host of agency problems of difficult solution and that the existing regulatory framework, intended to minimize these agency costs, may end up being unduly restrictive on banks provisioning practices.

Banks are no exceptions to general corporate behavior and their actions result from the interactions of different stakeholders some of which (the banks' outsiders: employees, minority shareholders and the fiscal authority) are not formally sitting in the executive boards, while others (the banks' insiders: managers and majority shareholders) are actively involved in the bank's policy decisions. Imperfect control and monitoring ability of insiders by outsiders is for banks as for nonfinancial corporations a source of agency problems.

The allocation of banks' operating profits among provisions, income taxes, dividends and retained earnings is a highly judgmental decision which rests to a large extent on manager's autonomous judgment. The lack of transparency of these decisions have led banks' outsiders to find different forms of protection of their claims over banks' profits. One form of protection is represented by legal provisions that promote minority shareholders' rights. La Porta et al. (2000), for example, have recently found empirical support to an agency based explanation of corporate dividend payments and claim that Anglo Saxon legal systems are associated to higher pay out ratios. Analogously we suggest that higher dividend payments could come at the expense of sound provisioning charges.

If it were not for asymmetric information it is very likely that bank managers would set their provisions according to expected losses, reducing profits volatility by drawing down loan loss reserves during bad times and increasing them in good times. Kim and Santomero (1977) show, in fact, that with incomplete but symmetric information, profit

maximizing bank managers should follow profit smoothing strategies, setting provisions in line with expected losses.<sup>8</sup>

The previous considerations support the notion that asymmetric information and the related agency costs may well be the factors that have prevented banks from adopting a more symmetric accounting treatment of expected losses on both sides of their ledgers.

But how many are the relevant categories of bank outsiders trying to protect their rights to banks' profits? And how does protection of corporate outsiders affect bank provisioning policies? We conjecture, following Laporta et al. (2000) that one important category of outsiders is represented by minority shareholders trying to achieve higher payout ratios. We also suggest that a second powerful outsider is represented by the fiscal authority, that according to the state of public finances may promote more or less stringent rules to protect tax revenues.<sup>9</sup> According to outsiders' effectiveness in protecting their claims, bank managers will revise the share of banks' EBTDA available for loan loss provisioning. Our hypothesis suggests, therefore, that higher shareholder protection and higher public debt ratios to GDP could be associated on average with a lower amount of general provisions.

As for the inclusion of the fiscal authority among bank outsiders, we have scattered evidence that fiscal incentives to loan loss provisioning reacts to the state of public finance. In the US, for instance, the fiscal treatment of bank provisions has followed the evolution of the fiscal deficit. After several decades in which bank regulation allowed banks to built tax exempt provisions, based on historical worst case scenarios, the higher fiscal deficits of the 1980s have been mirrored by a progressive scaling down of tax exemptions and by their final cancellation in 1986 (Conway and Siegenthaler, 1987). The problem is not alleviated by public ownership of the banking sector. In fact, the

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<sup>8</sup> Kim and Santomero (1993) show that when the observation of loan quality is costly and is subject only to periodic reviews (by the bank or by bank supervisors) the positive association of bank earnings and provisions is the simple result of statistical forecasting. The positive association remains in place also when the uncertainty is extended to the distribution of default frequencies, if bankers follow the rational approach of adapting their priors on the basis of new historical evidence, through a Bayesian process.

<sup>9</sup> Countries where public ownership of the banking sector eliminates the agency conflict between the management and the fiscal authority still face a conflict between sound management (profit maximization) and pursue of extra-managerial objectives (unrelated to profit maximization). In the extreme case of full state ownership, taxation, as the most effective means of appropriation of banks earnings, still conflicts with the maximization of banks' value.

heightened perception of an implicit guarantee is likely to further discourage sound provisioning policies exposing banks to the same instability caused by excessive outsiders protection<sup>10</sup>.

What are the welfare implications of this agency approach to profit allocation? La Porta et al. (2000) claim that, differently from what suggested by Modigliani and Miller original work, dividend policy affects the investment policy of the firm by influencing the frequency of its recourse to the market and therefore increasing the effectiveness of market discipline and the efficiency of marginal investments. They also suggest that corporate outsiders would be penalized through asset diversion, transfer prices and other appropriation mechanisms on the part of corporate insiders, unless they are given the right to share the firm's profits in accordance with some pro rata mechanism such as defined by dividend payment policies.

When we move from the corporate to the banking sector does the same kind of considerations apply, or should additional elements be brought into the picture? In the first place, banks' high leverage makes them more vulnerable to asset values volatility, suggesting the need for larger provisions. It is therefore conceivable that lack of differentiated patterns of outsiders protection in the corporate and in the banking sector may lead to under provisioning with negative effects on bank stability.

Second, excessive fiscal pressures may reduce, instead of increasing, the present value of net fiscal revenues. In fact, should the tax code discourage provisioning and increase bank fragility, the fiscal authority could be faced in the future with an increased cost of the safety net vastly exceeding the present fiscal cost of adequate tax incentives to sound provisioning practices.

Third, less developed institutional settings, lacking the richer set of controls that goes under the name of market discipline, may have to resort more extensively to prescriptive measures, like mandatory payments, to protect corporate outsiders. Such a prescriptive approach may unduly restrict risk management flexibility with ultimate

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<sup>10</sup> Countries where public ownership of the banking sector eliminates the agency conflict between the management and the fiscal authority still face a conflict between sound management (profit maximization) and pursue of extra-managerial objectives (unrelated to profit maximization). In the extreme case of full

negative effects on banks solidity. Finally, the pervasive prudential regulation of the banking sector seems to make less compelling the argument in favor of dividend protection as a form of minority shareholders protection against rapacious managers.

Summarizing, the agency approach provides a rationale for some relevant features of the regulatory framework for loan loss provisions that we observe in most countries. The same approach would suggest that the scale of benefits associated to the protection of outsiders claims in the corporate sector may not be the same when considering the banking sector. More specifically, it seems that in the case of banks, a balance needs to be found between the protection of outsiders and the encouragement of loan loss provisioning.

An implication of the agency approach is that if recent advances in the area of credit risk measurement are bound to reduce the information asymmetries that characterize the banking sector, also the introduction of a new risk based approach to provisioning should be seen as easier. A concurrent positive development is represented by the worldwide process of fiscal consolidation that may favor tax deductions of loan loss provisions up to levels commensurate to the expected losses.

#### **4. Income smoothing properties of loan loss provisioning**

Loan loss provisions in line with expected losses would not only remove accounting distortions in the representation of bank profitability, but could also improve bank stability. In fact, when outsiders find their claim protected during periods of positive earnings but are not committed to any loss sharing mechanism during economic downturns, banks tend to pay excessive dividends in good times instead of increasing capital and reserves as the following simulation will help to visualize. To this end we define, first, the main components of lending rates and then use them in a schematic representation of the profit and loss statement, to be simulated over a full economic cycle.

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state ownership, taxation, as the most effective means of appropriation of banks earnings, still conflicts with the maximization of banks' value.

Profit maximizing banks set their lending rates ( $r_L$ ) as a sum of the risk-free interest rate ( $r_B$ ), of the (unconditional) expected loss ratio  $E(d)$  and of the risk premium ( $k$ ).<sup>11</sup> Expressing the expected losses  $E(d)$  as a rate of return per unit of time we have the following expression:

$$r_L = r_B + E(d) + k + c. \quad (1)$$

The sum of the risk-free rate ( $r_B$ ) and the risk premium ( $k$ ) provides the remuneration for the cost of borrowed funds and of capital. We also assume that the remuneration of unit operating costs ( $c$ ) times the volume of outstanding loans ( $L$ ) fully covers the total amount of operating costs ( $OC$ ) so that  $c \cdot L = OC$ . The  $E(d)$  component is instead the yearly amount of provisioning that is needed to match the average amount of losses faced by each loan over the economic cycle. This simplified representation of banks' interest setting shows that banks will experience excess returns in good times when the default rate is lower than  $E(d)$  and will not be able to cover their costs when the default rate is higher than its average level.

The spread between the lending rate and the average cost of funding ( $r_D$ ) times the amount of outstanding loans ( $L$ ) gives the net interest income (NII). Subtracting the value of loan losses ( $\Delta BL$ ) we get the bank earning before taxes ( $\pi$ ). When loan loss provision are kept equal to zero the pre-tax profit takes the form described in equation 2, where loans and bad loans carry a superscript indicating that, differently from other variables, they are stochastic variables with a cyclical pattern:

$$\begin{aligned} \pi &= \tilde{L}[(r_B + E(d) + k) - r_D] - \Delta \tilde{BL} \\ &= \tilde{L}[(r_B + k) - r_D] + \left( \tilde{L} \cdot E(d) - \Delta \tilde{BL} \right) \end{aligned} \quad (2)$$

Equation 2 shows that during cyclical downswings an increase of bad loans and a reduction of the interest income (due to the reduction of outstanding loans) will cumulate their negative effects on pre-tax profits. During economic booms a higher level of loans will, on the contrary, generate higher interest revenues while write offs below average will provide an additional boost to profits.

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<sup>11</sup> The risk premium under the CAPM model could be quantified by the relation  $k = \beta (r_m - r_B)$ , where  $r_m$  is

Let's now turn to the case of partial provisioning where loan loss provisions are set equal to a fraction  $\gamma$  of the expected default ratio  $E(d)$ :

$$\pi = \tilde{L}[(r_B + E(d) + k) - r_D] - \Delta \tilde{BL} - \left( \gamma \cdot E(d) \cdot \tilde{L} - \Delta \tilde{BL} \right) \quad (3)$$

$$= \tilde{L}[(r_B + k) - r_D] + (1 - \gamma) \cdot E(d) \cdot \tilde{L} \quad \text{if } LLR > 0 \quad (3A)$$

$$= \tilde{L}[(r_B + k) - r_D] - \left( E(d) \cdot \tilde{L} - \Delta \tilde{BL} \right) \quad \text{if } LLR = 0 \quad (3B)$$

In this case banks will be willing to set aside provisions in excess of write offs during cyclical upswings. The last term in parenthesis of equation 3 represents the amount of net provisions as given by the difference between gross provisions ( $\gamma E(d)L$ ) and write offs ( $\Delta BL$ ). Net provisions are positive when write offs are smaller than the provisions and Loan Loss Reserves (LLR) increase. When write offs rise, during cyclical contractions, net provisions are negative which means that previously accumulated loan loss reserves are gradually drawn down. This pattern of general provisions, labeled "dynamic provisioning", has recently been introduced by the Spanish banking authorities (Poveda, 2000) and forcefully advocated by the French Commission Bancaire (Commission Bancaire, 2000) to help preventing cyclical fluctuations in the supply of bank credit to the economy. When loan loss reserves (LLR) are fully depleted (equation 3B) we revert to the case of no provisions described in equation 1. It is interesting to observe that until reserves are depleted (equation 3A) the cyclical impact of write offs ( $\Delta BL$ ) on profits has been eliminated.

Lets now consider the last case in which provisions are set equal to the level of the expected default ratio:

$$\begin{aligned} \pi &= \tilde{L}[(r_B + E(d) + k) - r_D] - \Delta \tilde{BL} - \left( E(d) \cdot \tilde{L} - \Delta \tilde{BL} \right) \\ &= \tilde{L}[(r_B + k) - r_D] \end{aligned} \quad (4)$$

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the rate of return of the market portfolio.



In this case, having set the level of provisions equal to the expected default ratio, the draw from loan loss reserves is never larger than the outstanding stock so that the case of previous equation 3B never obtains. As in the case of equation 3A the cyclical impact of write offs on profits has been completely eliminated. In addition, we notice that now also the effect of the asymmetric treatment of expected losses on the revenue and on the cost side of the income statement, represented by the term  $[(1-\gamma)E(d)L]$ , has been washed out. With full provisioning the only source of banks' earnings variability is the unavoidable oscillation of the demand for loanable funds over the economic cycle.

To visualize the impact of the three provisioning regimes on bank profitability and capital we have simulated the pattern followed over the cycle by bank loans, provisions, operating income, taxes and profits. For this purpose we have considered an hypothetical loan portfolio where loans are implicitly rolled over on a yearly basis unless the borrower defaults or the loan is reimbursed. We also have assumed that the amount of write offs increases when the demand for loans is weaker and that as a result of these two forces the NPL ratio oscillates between 4 and 18 per cent of total assets over the cycle. (Fig. 2). While default ratios of this entity are not infrequent in developing countries our results would not change for countries where, due to a lower cyclical instability and to a better risk management, NPL ratios are less volatile.<sup>12</sup> Figure 3 shows the oscillations of net provisions (fixed provisioning rate less effective write offs) as defined in equations 3 and 4 together with the fluctuations of the operating income.<sup>13</sup> When gross provisions are set equal to the (unconditional) expectation of loan losses, net provisions show a regular pattern that follows that of the operating income. On the contrary when gross provisions are set equal to a fraction of the value of the (unconditional) expectation of loan losses net provisions follow a highly irregular pattern.

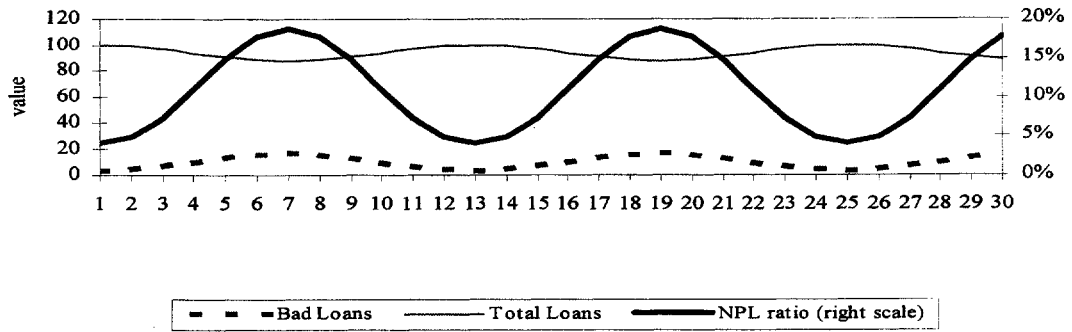
As a result of the interaction of write-offs and net provisioning, in the three provisioning regimes, described by equations 2, 3 and 4, before tax earnings display the oscillations described in Figure 4.

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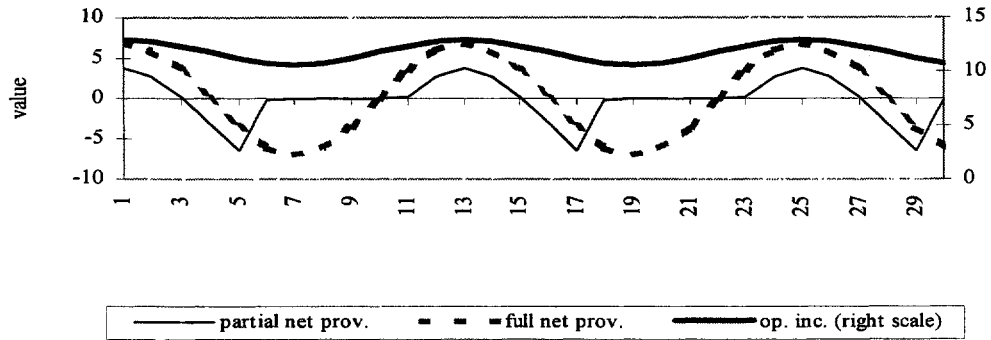
<sup>12</sup> For expository purposes the simulation is conducted around a stationary time trend but results would not be affected considering oscillations of bank lending around a growing time trend.

<sup>13</sup> A full description of the cost and income ratios used in the simulations is described in the footnote to Table 1.

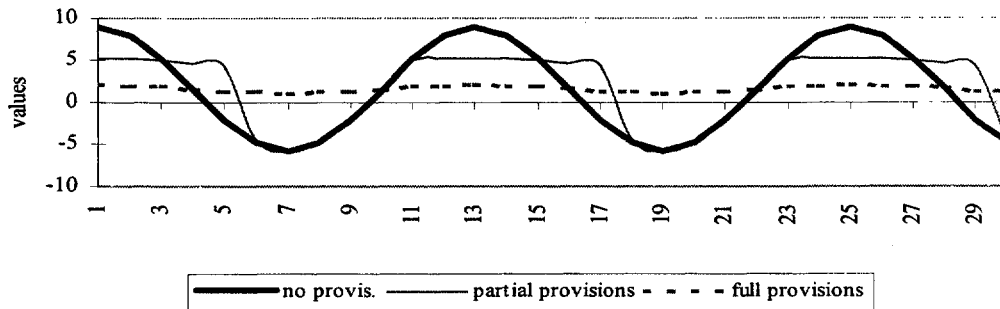
**Figure 2: Total loans, bad loans and NPL ratio**



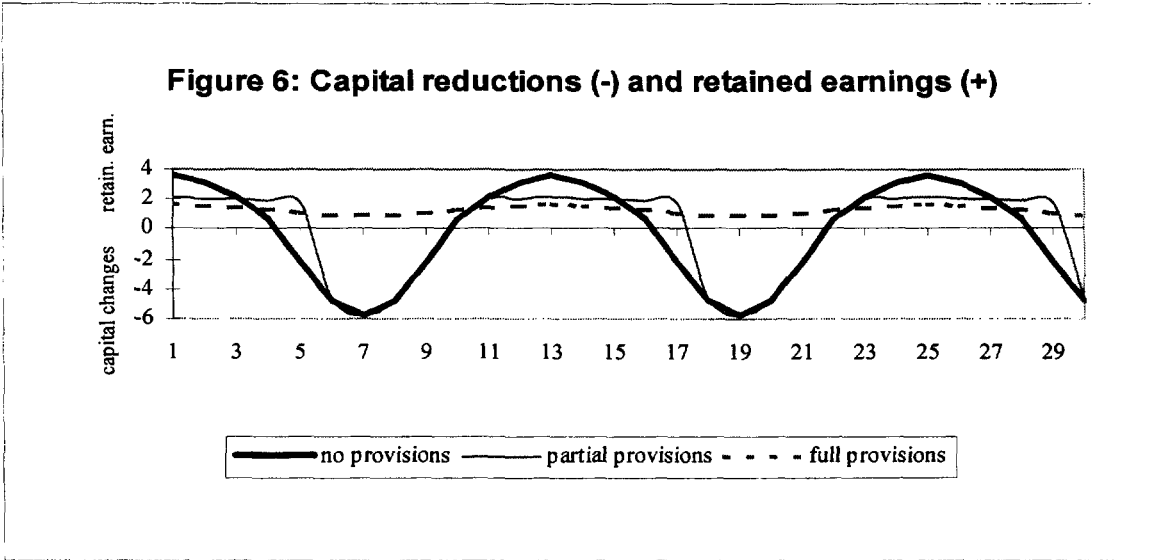
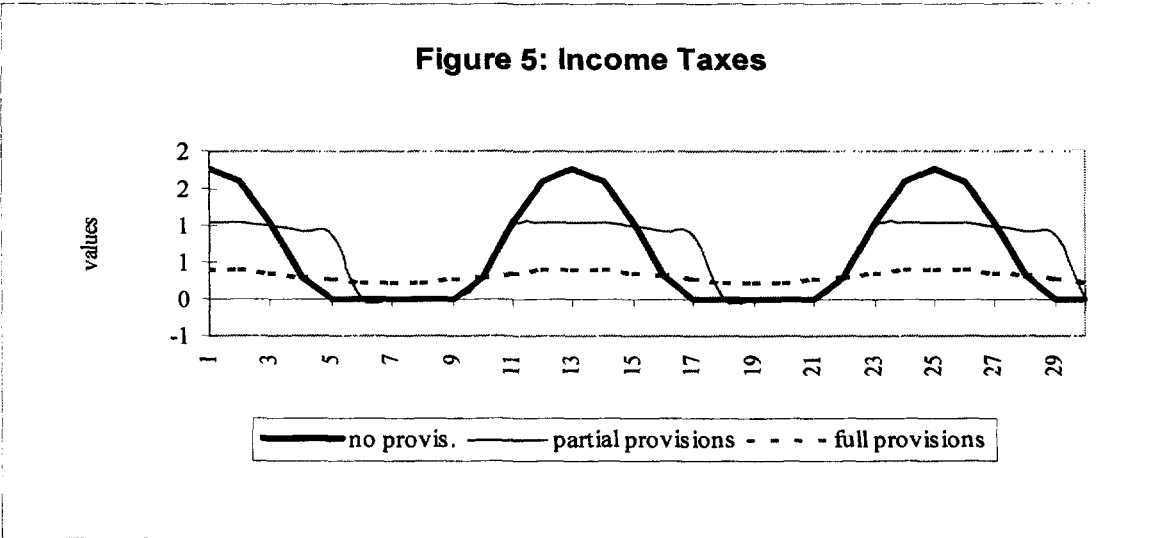
**Figure 3: Operating profits and provisions**



**Figure 4: Pre-tax Earning**



Assuming an income tax ratio of 20 per cent, income taxes would follow the pattern reported in Figure 5: smooth for the full provisioning regime; less regular for the other two regimes. Net profits would then be partitioned between retained earnings and dividend payments according to the selected pay out ratio. Assuming a pay out ratio equal to 0.5 we can simulate the dynamic of banks capital as a result of retained earnings during periods of positive profits and of capital reductions during periods of losses. With full provisioning the above described dynamics leads to a rather stable evolution of retained earnings without any reduction of the existing capital over the cycle (Figure 6), while an alternating sequence of retained earnings in good times and of capital reductions in bad times appears to prevail in the other two regimes.



The simulation shows that whenever banks follow a sound pricing policy but do not fully provision for (unconditional) expected losses an impact on capital is to be expected. The question is whether capital reductions are going to be replenished by retained earnings during cyclical upturns. Table 1 shows that when bank outsiders share the earnings but not the losses a progressive erosion of bank capital takes place: the sum of retained earnings is in fact smaller than the reduction of capital both in the no provisions and in the partial provisions regime. Table 1 reports few additional results. The large earnings fluctuations generated by inadequate provisioning do not allow bank outsiders to clearly perceive whether their share in the banks income is different from zero. In fact only in the case of full provisioning the tax authority (taxes) and the shareholders (net profits) achieve positive results that exceed two times the standard deviation and can be considered statistically different from zero with a reasonably high level of confidence. In addition, the higher volatility of profits observed in the case of null and partial provisioning is likely to generate a higher cost of capital which would make capital shortages even more severe in these two regimes.

Let's now briefly consider the implication of setting minimum capital requirements equal to the sum of expected and unexpected losses as suggested by the new capital regulation proposed by the BCBS. The main implication is that the amount of financial resources required to dampen cyclical fluctuations would increase. In fact the level of capital requirement would now include the level of expected losses but would not allow loan loss reserves to adjust over the cycle and would not therefore have the smoothing properties of "dynamic provisioning" practices. Using as an example the partial provisioning regime of equation 2 we would have that the reversion to the high cyclical instability, which follows from loan loss reserves depletion ( $LLR=0$ ), would now be triggered at a higher level of reserves ( $LLR=X$ , with  $X>0$ ). From an incentive perspective the new regulation would have the negative implication of reducing the amount of reserves granted tax exemption that can be used for income smoothing<sup>14</sup>.

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<sup>14</sup> To include reserves as a component of minimum capital requirement amounts to set for them a point requirement instead of an average requirement. The destabilizing effects of point requirements have been well understood in the regulation of compulsory reserves on bank deposits that in most countries are required to hold "on average over the maintenance period" but not for every single day, stabilizing bank liquidity fluctuations over the maintenance periods.

Summarizing, it could be said that to the extent that the notion of regulatory capital coincides with that of *minimum* capital requirements, capital requirements should deal only with unexpected losses and should not include general loan loss reserves as a component of regulatory capital. If, instead, regulatory capital were intended as an *average* capital requirement it could be properly be referred to both expected and unexpected components and have general loan loss reserves as a component. The present situation whereby the objective of minimum capital requirements is achieved by a composition of regulatory capital consistent with an average requirement is likely to be suboptimal.

## 5. The estimation procedure

In order to verify the nature of the relationship between banks' earnings and to test our hypotheses about the determinants of banks' provisioning decisions, we have estimated the following econometric relationship:

$$LLP_{i,t} = \alpha + \beta \cdot BSV_{i,t} + \gamma \cdot CMI_{i,t} + \delta \cdot CII_i + \eta \cdot CBD_i + \vartheta \cdot TD_t + \varepsilon_{i,t} \quad (5)$$

where loan loss provisions (LLP) for the bank  $i$  at time  $t$  are a function of bank specific variables (BSV), of a selected number of the bank's own country macro indicators (CMI) and institutional indicators (CII) and of time specific dummies (TD). As an alternative to country institutional indicators (CII) we have used country or bank dummies (CBD) as a proxy for institution or country specific factors.

To test the robustness of the econometric results we have estimated equation 5 with different regression techniques. We have first run a cross section OLS regression based on the average value of bank level variables (the "between" effect model). We have then replicated the same regressions as a pooled OLS in order to test for the effects of time invariant variables, such as the legal and institutional indicators, that cannot be tested in a fixed effect panel estimation. Finally we have run a panel fixed effect estimation (the "within" effect model) without legal indicators.

Both pooled OLS and fixed effect panel regressions have been estimated first on the whole sample and then separately for the two sub-samples represented by banks

located in G10 countries and by those located in non-G10 countries. As an additional check of robustness, the set of estimates for the three samples (total banks, G10 banks, non-G10 banks) has been replicated for shorter sample periods, smaller set of countries, and using more stringent filtering procedures for outliers exclusion. All regressions have been estimated making use of the White correction for heteroskedasticity.

### **5.1 The data**

The data include banks' balance sheet information and proxies for country specific macroeconomic and institutional features over the period 1988 to 1999. We included in our sample the countries that had over the sample period at least three commercial banks recorded in the Bankscope database and that are also reported in the La Porta et al. (1998) dataset on legal features. We have then eliminated the banks that over the sample period had less than three consecutive years of balance sheet observations, in order to control for the consistency and quality of bank reporting. Finally, in order to minimize the effects of measurement errors we have excluded all the outliers by eliminating the bank/year observations that did not meet one of the following conditions:

- a ratio of loan loss provisions over total assets smaller than or equal to 10%;
- a ratio of earnings before provisions over total assets smaller than 10%;
- a ratio of total loans over total assets bigger than 10 % and smaller than 90%;
- a growth rate of bank loans in real terms smaller than 50% in absolute value.

The resulting sample included 36 countries<sup>15</sup>, with a total of 1176 banks, 372 of which from non-G10 countries. The dependent variable is represented by the ratio of loan loss provisions over total assets. Explanatory variables include firm specific determinants and country specific determinants. At the firm level we have considered as a proxy of bank's EBTDA the value of pre-tax earnings net of loan loss provisions, and as proxies of credit risk exposures the ratio of banks' loans over total assets and the real growth rate of bank loans. The first indicator takes smaller values for institutions that invest a

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<sup>15</sup> The final sample non-G10 countries considered are Australia, Chile, Colombia, Denmark, Finland, Greece, Indonesia, Ireland, Israel, Jordan, Korea, Malaysia, Mexico, New Zealand, Norway, Pakistan, Peru, Philippines, Portugal, Singapore, South Africa, Spain, Thailand, Turkey, Uruguay. The G-10 countries are Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland, United Kingdom, and United States.

substantial share of their portfolio in “riskless” government bonds and are therefore less risky. The second also is positively associated to risk, given that rapid growth of bank lending is generally associated with lower monitoring efforts and a deterioration of the quality of loan portfolios. A prudent bank is expected to show a positive association between the amount of loan loss provisions and the value of EBTDA and of the two risk indicators.

At the country level we have considered, in addition to individual country dummies intended to catch the unique features of national economic and institutional features, the value of per capita GDP, as an additional proxy of institutional quality, and the ratio of public debt over GDP as a measure of fiscal pressure. Both indicators are expected to be negatively related to loan loss provisioning. A high level of per capita GDP should, in fact, signal a high quality institutional setting with adequate incentives for debtors to fulfill their obligations and one where banks can lower their provisions. A high level of public debt, instead, signals a propensity of the fiscal authority to widen the tax base and to limit tax exemptions for banks’ loan loss provisions. It is also to be expected that the negative fiscal effect will be stronger for countries with a large volume of financial intermediation, where the banking system is an important source of fiscal revenues.

Among the indicators of legal and regulatory framework we have considered the traditional indicators of common law, creditor rights and rule of law as measured by La Porta et al. (1998). The two first indicators are expected to be associated with higher protection of minority shareholders and of creditors rights and should therefore be positively related to the amount of dividends (La Porta et al., 2000) and negatively related to the value of loan loss provisions. Finally, the indicator of Rule of Law has been included to catch the effect of more severe enforcement practices for any given level of creditors or minority shareholders protection. The expected sign on the amounts of loan loss provisions is positive.

Table 2 provides some descriptive statistics about the variables in our estimation sample. As a ratio to total assets, loan loss provisions are on average equal to half a percentage point (standard deviation of 0.8 per cent) and earnings before taxes and

provisions are equal to 1.6 per cent (standard deviation of 1.2 per cent). Loans represent an average 58.3 per cent share of banks' portfolios and their average real rate of growth is equal to 4.5 per cent. Countries have an average real per capita GDP of 2,200 US dollars, ranging from a minimum of 500 to a maximum of 45,000 US dollars, and an average ratio of public debt to GDP of 45 per cent, ranging from a minimum of 3 to a maximum of 135 per cent. A description of the sources and of the construction of each individual variable is provided in the Appendix.

## **5.2 Estimation Results**

The estimation results, reported in Tables 3 to 7, show a considerable degree of stability across the different estimation approaches both in terms of size and sign of the estimated coefficients. Tables 3 to 6 report the outcomes of the same four alternative specifications of equation 5 for the cross section and the pooled OLS. Column 1 shows the results of a regression of loan loss provisions against bank specific variables and country and time dummy variables; columns 2 and 3 illustrate the effects of adding the two macroeconomic variables to the picture; column 4 shows the impact deriving from the substitution of country specific dummy variables with legal regime specific dummy variables.

Cross section estimates (Table 3) show a positive relationship between the ratio of loan loss provisions over total assets and bank earnings, confirming previous results for the US market supportive of an income smoothing pattern (Greenawalt and Sinkey, 1988). A similarly strong positive relation is displayed by the share of loans over total assets, while a negative relation prevails with respect to the loan growth rate.

Provisions, therefore, seem to exhibit the desirable positive association with earnings but their association with the amount of risk embedded in banks balance sheets is somewhat contradictory. The ratio of loans over total assets has the expected positive sign, while the loan growth rate has a negative sign implying that provisions tend to decrease as a share of total assets when the increase of new lending and the decrease of monitoring tend to reinforce the risk exposure of banks portfolios. Although some mild correlation is present among these variables, their statistical significance and estimated values have shown not to be sensitive to the inclusion or exclusion of each of them.



The indicator of the fiscal pressure, represented by the public debt over GDP is also strongly significant with the expected negative sign, supporting the hypothesis that a stronger incentive to widen the tax base may negatively affect banks provisioning patterns. The per capita GDP, instead, does not turn out to be statistically significant but enters with expected sign. In all the previous specifications country dummies turn out to be strongly jointly significant. Among the indicators of the legal system we find evidence of lower bank loan loss provisions in common law countries and a positive one with the effectiveness of enforcement practices as summarized by the rule of law indicator. The indicator of creditor rights, instead, does not appear to exert an independent effect although it enters the equation with the expected sign.

Although the cross section estimates appear very supportive of our priors, our interest for provisioning practices over the cycle requires a careful verification of the robustness of these results to the introduction of the time dimension in the estimation sample.

When replicating the estimation of the previous four regression specifications with a pooled OLS we find a widespread confirmation of previous results with only minor changes in the values of point estimates. As reported in table 4 the coefficient associated to bank earnings shrinks on average from 0.23 to 0.13, but remains strongly significant.

The next step of the analysis is to verify to what extent these results hold for countries at different level of institutional development. Different levels of information availability about borrowers behavior, different levels of portfolio diversification and other factors may significantly affect the incentive of bank customers to fulfill their obligations requiring different provisioning patterns. We replicate therefore the previous regressions dividing the previous sample in the two mutually exclusive sub samples represented by banks active in G10 countries and those active in non-G10 countries.

Estimation results for G10 banks are reported in Table 5. They show, again, a large convergence with those from the two previous sets of regressions. The point value of the coefficient related to bank earnings is now higher – 0.21 from 0.13 - suggesting that income smoothing behavior may be more pronounced in more developed financial

systems. Also the indicators of legal and institutional features appears to be highly significant and each with the expected sign.

The picture changes considerably when we turn to non-G10 countries, as showed in Table 6. Most notably the relationship between bank earnings and loan loss provisioning seems to disappear. The coefficient turns negative and loses any statistical significance. The fact that the coefficients associated with the proxies of risk exposure are still significant with the same signs of previous equations seems to suggest that the average amount of provisions is not dissimilar between the two groups of countries but that there is a difference in their timing along the cycle, such that an income smoothing pattern prevails only in G10 countries. It is also interesting to observe that the public debt to GDP ratio maintains its negative effect, not dissimilarly from G10 banks, and that also the indicators of a common law legal system maintains its relevance. The same regressions has been run also for non-G10 OECD countries to verify whether the results could have been driven by countries in the lowest income category but results of table 6 were widely confirmed.

As a final test of robustness we have removed the constraint of a common intercept for all banks from the same country, implicit in the OLS pooled regressions and we have run a fixed effect panel regression. Interestingly, the fixed effect regression for the whole sample shows that the bank earnings variable loses statistical significance, similarly to what we have found previously for non-G10 countries, while the risk indicators appear solidly anchored to their signs and values. Based on the intuition provided by the simulations of Section 4 we have tried to distinguish the provisioning patterns during phases of positive and of negative earnings. More specifically we have interacted the earning variable with a dummy taking unit value when earnings are negative and null elsewhere. As expected an asymmetry of behavior has emerged, with statistically significant coefficient for both profits and losses. Still the negative sign of the coefficient of the interactive dummy for bank losses appears counterintuitive: negative earnings time a negative coefficient generate in fact higher provisions – instead of the expected lower one – during cyclical downswings. The replication of the same regression for G10 and non-G10 banks seems to provide the clue.

The fixed effect panel regression for G10 does not show any of the previously discussed asymmetries: banks earnings enter significantly in the equation and negative earnings do not have any independent effect. The whole asymmetry is in fact concentrated in the non-G10 component of the sample where we observe both a positive level of provisioning during upswings (and higher than for G10 banks) and an even higher (not lower) one during downswings. This evidence is consistent with inadequate provisioning of non-G10 banks that leads to delayed and higher provisioning during downturns. Loan loss provisions therefore increase when earnings fall.

In addition to the cyclical implications of fixed effect panel estimates, we should recall that the negative impact of the fiscal pressure indicator is also strongly supported and is robust to the inclusion (as reported in Table 7) and to the exclusion of per capita GDP. Overall, the collected empirical evidence support quite robustly our initial guesses. The prevailing incentive structure significantly affects the pattern of banks loan loss provisioning with potential impacts on banks financial fragility. Over our estimation sample, though, the incentive structure has forced a general build up of provisions during cyclical downturns only for banks located in non-G10 countries.

## **6. Conclusions**

This paper has adopted an agency approach to bank loan loss provisioning similar to that recently used to explain dividend payments in La Porta et al. (2000). The agency approach claims that the amount of legal protection granted to firm's outsiders affects the allocation of a firm's earnings. In our case we restrict the attention to banking firms and extend the class of firm outsiders, traditionally represented by minority shareholders, to include an additional and powerful player: the fiscal authority.

While it is well known that the fiscal authority may affect relevant business decisions for non financial firms, this is even more so for banks. Excessive restrictions or fiscal disincentives to adequate provisioning may result in the weakening of banks' financial stability. Banks are in fact considerably more leveraged than manufacturing firms, and need to devote a larger share of their operating profits to cover expected future asset depreciations. Banks, though, are also more opaque generating relevant agency

costs and the request for higher protection of "outsiders" claims over banks' earnings. Stronger minority shareholders will be able to reap higher dividend payments and a more assertive fiscal authority will obtain higher tax payments. In the case of the banking system, the fiscal authority though needs to properly balance the benefits of higher present fiscal revenues and of larger future costs of the safety net caused by weaker banking systems.

The econometric evidence shows that the protection of outsiders' claims (minority shareholders in common law countries and fiscal authority in high public debt countries) has negative effects on the level of bank provisions. While these effects do not seem to have had a negative impact on the provisioning pattern over the sample period for banks located in G10 countries, this is not so for banks located in non-G10 countries. The latter, in fact, have on average experienced higher flows of loan loss provisions during periods of negative profitability signaling an inadequate amount of provisioning during cyclical upturns.

Lacking adequate incentives for sound provisioning banks may not be able to shelter profits and capital from negative - but expected - repercussions of cyclical downturns. Where cyclical oscillations are particularly wide, as it is the case in less developed economies, inadequate provisioning may very quickly lead to capital shortages with undesirable pro-cyclical effects on the level of the economic activity. Our results suggest that sound provisioning should be considered as a component of capital regulation and that only through sound provisioning practices minimum capital regulation can lose its pro-cyclical features.

The recent proposal of a new Capital Accord set out for consultation by the BCBS does not address the need for a risk based regulation of bank provisions and does not provide new incentives to a proper treatment of expected losses. It confirms explicitly what was only implicit in the 1988 Capital Accord, that is, that capital is intended to deal both with expected and unexpected losses and that therefore general loan losses should be considered as a component of regulatory capital. By removing this anomaly the capital accord can be expected to lose many of the pro-cyclical features that have negatively characterized it in the past.

## **Appendix: Data Definition and Sources**

### **I. Definition**

**Provisions/Assets** = Loan Loss Provisions / Total Assets

**Earnings before Provisions / Assets** = (Profit before Tax + Loan Loss Provisions) / Total Assets

**Loans / Assets** = Total Loans / Total Assets

**Loans in Real Terms** = Total Loans / CPI

**Loans Growth Rate** = [Loans in Real Terms (-1) - Loans in Real Terms] / Loans in Real Terms (-1)

**GDP per Capita (in Thousands 1995 US Dollars)** = GDP at market prices (constant 1995 US Dollars) / 1000\*(Population, Total)

**Debt / GDP** = Public Debt / Gross Domestic Product

### **II. Sources**

#### **Income Statement and Balance Sheet Items taken from Bank Scope**

Loan Loss Provisions – Bank Scope, summary code No: 2095

Profit before Tax – Bank Scope, summary code No: 2105

Total Loans – Bank Scope, summary code No: 2000

Total Assets – Bank Scope, summary code No: 2050

#### **Series from the IMF and the World Bank**

CPI (1995) = 100 – IFS line 64

GDP at market prices (constant 1995 US Dollars) – World Development Indicators.

Population, Total – World Development Indicators.

Public Debt – IFS line 88, GFSY and OECD Analytical Indicators – Maastricht definition (for EU countries).

Gross Domestic Product – IFS line 99b

#### **Data from La Porta et al. (1998)**

Common Law – La Porta et al. (1998)

Rule of Law - La Porta et al. (1998)

Creditor Rights - La Porta et al. (1998)

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**Table 1: Simulated Earnings with Different Provision Rules**  
(percent of total assets)

	<i>No provision</i>	<i>Partial provision</i>	<i>Full provisions</i>
<b>Average values (standard deviations in parenthesis)</b>			
Earnings before taxes	1.56 (5.44)	1.56 (4.54)	1.56 (0.32)
Taxes	0.64 (0.72)	0.60 (0.49)	0.31 (0.06)
Net profits	0.92 (4.76)	0.96 (4.07)	1.25 (0.26)
Retained earnings	1.28 (1.44)	1.20 (0.97)	0.63 (0.13)
<b>Cumulative variations over a full cycle</b>			
Earnings before taxes	18.8	18.8	18.8
Taxes	7.7	7.2	3.8
Net profits	11.1	11.5	15.0
Retained earnings	15.4	14.4	7.5
Capital shortages	-19.7	-17.4	0

The simulations are done along an hypothetical cycle, assuming an NPL ratio equal to 11 percent; a full provisioning ratio of 11 percent; a partial provisioning ratio of 7.7 percent; a tax ratio of 20 percent; a pay-out ratio of 50 percent.

**Table 2: Regression Variables - Summary Statistics**

<i>Variable</i>	<i>No. Obs</i>	<i>Mean (%)</i>	<i>Std. Dev. (%)</i>	<i>Min (%)</i>	<i>Max (%)</i>
Provisions / Total Assets	5957	0.54	0.82	-5.86	9.88
EBTDA / Total Assets	5957	1.63	1.20	-6.49	9.81
Total Loans / Total Assets	5957	58.29	15.96	10.09	89.98
Loans Growth Rate	5957	4.52	16.45	-49.95	49.93
GDP per Capita <sup>a</sup>	5957	220.9	101.0	5.10	449.9
Debt / GDP (%)	5957	53.39	24.53	3.73	135.15

<sup>a</sup> Hundreds of constant 1995 US dollars.



**Table 3: Cross-Section Regressions**

The regressions are estimated using ordinary least squares with robust standard errors pooling average bank data across 36 countries for the 1988 – 1999 time period. The first two regression also include country dummy variables for which only the F-Test of joint significance is reported. The dependent variable is the ratio of provisions over total assets. Detailed variable definitions and data sources are given in the appendix. Standard errors are given in parentheses.

<i>Dependent Variables</i>	(1)	(2)	(4)	(3)
<b>Bank Indicators</b>				
EBTDA / Total Assets	0.230*** (0.017)	0.230*** (0.010)	0.231*** (0.016)	0.211*** (0.016)
Total Loans / Total Assets	0.010*** (0.001)	0.010*** (0.002)	0.009*** (0.001)	0.008*** (0.001)
Growth Rate of Loans	-0.015*** (0.002)	-0.014*** (0.002)	-0.014*** (0.002)	-0.016*** (0.002)
<b>Macro Indicators</b>				
Ln (Debt / GDP)		-0.762*** (0.187)	-1.040*** (0.265)	-0.017* (0.040)
Ln (real GDP per capita)			-1.699 (1.149)	-0.087* (0.045)
<b>Institutional Indicators</b>				
Common Law				-0.232*** (0.046)
Rule of Law				0.033*** (0.022)
Creditor Rights				-0.020 (0.017)
<b>Joint significance tests</b>				
Country dummies F (35,1128)	9.56*** (0.000)	10.15*** (0.000)	10.09*** (0.000)	-
Time dummies F (9,1128)	8.17*** (0.000)	7.98*** (0.000)	2.74*** (0.004)	2.64*** (0.005)
Adj. R <sup>2</sup>	0.40	0.41	0.24	0.24
No. Obs	1176	1176	1176	1173

\* / \*\* / \*\*\* Indicate significance levels of 10, 5 and 1 percent respectively.

**Table 4: Pooled Regressions**

The regressions are estimated using ordinary least squares with robust standard errors pooling time-series bank data across 36 countries for the 1988 – 1999 time period. The first two regression also include country dummy variables for which only the F-Test of joint significance is reported. The dependent variable is the ratio of provisions over total assets. Detailed variable definitions and data sources are given in the appendix. Standard errors are given in parentheses.

<i>Dependent Variables</i>	(1)	(2)	(3)	(4)
<b>Bank Indicators</b>				
EBTDA / Total Assets	0.136*** (0.024)	0.134*** (0.024)	0.135*** (0.024)	0.136*** (0.023)
Total Loans / Total Assets	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.009*** (0.001)
Growth Rate of Loans	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)
<b>Macro Indicators</b>				
LN (Debt / GDP)		-0.261*** (0.066)	-0.706*** (0.124)	-0.027 (0.023)
LN (real GDP per capita)			-2.664*** (0.498)	-0.113*** (0.025)
<b>Institutional Indicators</b>				
Common Law				-0.209*** (0.028)
Rule of Law				0.043*** (0.013)
Creditor Rights				-0.020* (0.011)
<b>Joint significance tests</b>				
Country dummies F (35,5909)	21.54*** (0.000)	22.12*** (0.000)	23.12*** (0.000)	-
Time dummies F (9,5909)	33.71*** (0.000)	30.55*** (0.000)	8.33*** (0.000)	17.18*** (0.000)
Adj. R <sup>2</sup>	0.23	0.24	0.25	0.16
No. Obs	5957	5957	5957	5941

\* / \*\* / \*\*\* Indicate significance levels of 10, 5 and 1 percent respectively.

**Table 5: Pooled Regressions – G10 Countries**

The regressions are estimated using ordinary least squares with robust standard errors pooling time-series bank data across G10 countries for the 1988 – 1999 time period. The first two regression also include country dummy variables for which only the F-Test of joint significance is reported. The dependent variable is the ratio of provisions over total assets. Detailed variable definitions and data sources are given in the appendix. Standard errors are given in parentheses.

<i>Dependent Variables</i>	(1)	(2)	(3)	(4)
<b>Bank Indicators</b>				
EBTDA / Total Assets	0.207*** (0.028)	0.207*** (0.027)	0.207*** (0.027)	0.210*** (0.027)
Total Loans / Total Assets	0.009*** (0.001)	0.009*** (0.001)	0.009*** (0.001)	0.009*** (0.001)
Growth Rate of Loans	-0.010*** (0.001)	-0.010*** (0.001)	-0.010*** (0.001)	-0.010*** (0.001)
<b>Macro Indicators</b>				
LN (Debt / GDP)		-0.257** (0.119)	-1.264*** (0.202)	-0.512*** (0.048)
LN (real GDP per capita)			-7.019*** (1.121)	-1.505*** (0.082)
<b>Institutional Indicators</b>				
Common Law				-0.577*** (0.039)
Rule of Law				0.126*** (0.023)
Creditor Rights				-0.083*** (0.014)
<b>Joint significance tests</b>				
Country dummies F (9,4109)	55.26*** (0.000)	55.17*** (0.000)	48.38*** (0.000)	-
Prob (F)				-
Time dummies F (9,4109)	34.41*** (0.000)	22.89*** (0.000)	5.06*** (0.000)	9.56*** (0.000)
Prob (F)				
Adj. R <sup>2</sup>	0.27	0.27	0.28	0.27
No. Obs	4041	4041	4041	4041

\* / \*\* / \*\*\* Indicate significance levels of 10, 5 and 1 percent respectively.

**Table 6: Pooled Regressions – Non G10 Countries**

The regressions are estimated using ordinary least squares with robust standard errors pooling time-series bank data across 27 non G10 countries for the 1990 – 1999 time period. The first two regression also include country dummy variables for which only the F-Test of joint significance is reported. The dependent variable is the ratio of provisions over total assets. Detailed variable definitions and data sources are given in the appendix. Standard errors are given in parentheses.

<i>Dependent Variables</i>	(1)	(2)	(3)	(4)
<b>Bank Indicators</b>				
EBTDA / Total Assets	-0.028 (0.038)	-0.023 (0.038)	-0.027 (0.038)	-0.035 (0.034)
Total Loans / Total Assets	0.012*** (0.002)	0.012*** (0.002)	0.011*** (0.002)	0.011*** (0.002)
Growth Rate of Loans	-0.017*** (0.001)	-0.017*** (0.001)	-0.016*** (0.001)	-0.014*** (0.001)
<b>Macro Indicators</b>				
LN (Debt / GDP)		-0.259** (0.082)	-0.618*** (0.136)	-0.027 (0.032)
LN (real GDP per capita)			-2.334*** (0.563)	-0.009 (0.032)
<b>Institutional Indicators</b>				
Common Law				-0.214*** (0.056)
Rule of Law				-0.001 (0.020)
Creditor Rights				0.015 (0.016)
<b>Joint significance tests</b>				
Country dummies F (25,1878)	10.52*** (0.000)	11.03*** (0.000)	11.94*** (0.000)	-
Time dummies F (9,1878)	10.90*** (0.000)	11.46*** (0.000)	7.22*** (0.000)	7.83*** (0.000)
Adj. R <sup>2</sup>	0.21	0.23	0.24	0.13
No. Obs	1916	1916	1916	1916

\* / \*\* / \*\*\* Indicate significance levels of 10, 5 and 1 percent respectively.





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