Strength of market discipline: impact on the stability of European banks

Anissa NAOUAR[1]

This Version: January 2009

Abstract

The paper investigates the effectiveness of market discipline to influence the risk taking of European banks. Market discipline is defined as a component related to a number of factors that are 1) the extent of the government bail-out policies on banks inside and outside the safety net 2) the proportion of uninsured liabilities, 3) the disclosure policy of the bank and 4) its corporate governance. A panel model is adapted to 88 listed individual banks of 12 European countries using simultaneous regression of both capital buffer and risk position. The results suggest that implicit government guaranties help to increase risk taking of supported banks and decrease the disciplining impact of uninsured liabilities. However, disclosures of information together with the concentration of the ownership play a crucial role in enhancing the default risk of European banks. Findings suggest that strengthening market discipline by reducing implicit guaranties, limiting conflicts between shareholders and managers and reinforcing the disclosure policy might mitigate the risk of instability of European banks.

[1] Contact address : anissanaouar@yahoo.fr ou anissa.naouar@ceps. eu
Phone number :(+32) 471984146

Introduction

In its recent capital adequacy framework, the Basel Committee assigns market discipline an explicit and crucial role as one of the three "pillars" of capital regulation along with minimum capital requirements and supervisory review of capital adequacy (BIS (1999)). Despite the growing recognition of market discipline importance to banking soundness, the means by which it can best be achieved are still unknown. While the Basel Committee has called for adequate disclosure as a precondition and an integral part of market discipline, disclosure alone is not sufficient. Bank incentives for risk taking are also influenced by the strength of the explicit and implicit safety net, the degree of funding sources insurance and the relationship between managers and shareholders.

It is widely maintained that direct market discipline requires a mechanism through which the market investors in bank liabilities (subordinated debts or uninsured depositors) can penalize excessive risk taking. One reason for which market discipline is prominent is that banks are prone to engage in moral hazard behaviour. Indeed, the moral hazard problems associated with the safety net are widely recognized (Stern (1999), Gropp and Vesala (2001, (2004)). In relation to deposit insurance, the problem is that insured depositors no longer discipline the banks by refusing to place their money in risky institutions. The lender of last resort further insulates banks from the downside consequences of risky activities. In these circumstances, regulatory capital arbitrage is one manifestation of the underlying problem that attempts to establish regulations. Indeed, to safeguard against insolvency, banks hold capital buffers against adverse outcomes in their investments in risky assets; but the bank's private solvency target may not take into account the interests of depositors.

Therefore, the traditional approach to dealing with moral hazard involving a combination of capital standards, supervision and regulation of bank activities appears not fully effective and so the rationale for the use of market discipline is to minimize the problems that plague traditional methods of dealing with moral hazard.

Given the concern with the possible systemic consequences of bank failure and losses to public safety nets designed to minimize systemic risk, market should provide sufficient solvency signals allowing holders to demand management changes, or to let creditors or regulators able to intervene before a banks' capital becomes critical. Whereas the previous literature concentrated primarily on whether the market prices or liabilities react adversely to information about risk (Berger (1991)), Bliss and Flannery (2002), Evanoff and Wall (2000 a)), it does not reveal the degree to which market discipline is effective as an incentive scheme. Indeed, one interrogation is how market discipline can exert much pressure in the safety-net environment and influence bank behaviour.

To our knowledge, only one European study focused on this question (Nier and Baumann (2006)) without studying the ownership structure and the extent of government bail-out policies on banks outside the safety net. To fill this gap and provide further comprehensive evidence in this respect, the paper extends the existing literature and empirically investigates the effectiveness of market discipline in containing the bank behaviour (risk position and regulatory capital buffer). Its effectiveness hinges

on: 1) the extend of the government safety net, 2) the degree to which the bank is financed by uninsured liabilities, 3) the disclosure strategy of the bank and 4) the ownership structure of the bank.

As for the government safety net, we use a broad definition of public guaranties, including explicit and implicit guaranties.

Public guarantees are likely to reduce market discipline because creditors anticipate bank's bail- out and therefore have lower monitoring of the bank's risk incentives[2].

Moreover, the amount of uninsured liabilities is important because when bank deposits are uninsured and the bank risk choice is observable by depositors, the bank risk choice will be efficient and thereby market discipline will be effective. For instance, uninsured depositors, who are exposed to bank risk taking, may penalize riskier banks by requiring higher interest rates or by withdrawing their deposits. Contrary, when deposits are insured, moral hazard is high and in such world market discipline is weakened.

Regarding the bank disclosure of the risk position, we analyse at the same time the quality, the quantity and the timeliness of information disclosed. Market discipline is likely to be more effective, the greater is the degree of bank disclosure.

Finally, we analyse the effects of shareholders market discipline from the ownership structure and agency theory point of stand.

The paper proceeds as following: the first section presents the estimation procedure and the hypothesis tested. The section 2 provides a description of the variables of interest used in the regressions and the data sources. The Section 3 details the models specifications and the results. The section 4 assesses the robustness of the results and in the section 5, conclusions and policy implications are made.

I. Empirical Methodology

As mentioned earlier, the better the quality of the information about the bank and the lower the governments' guaranties and the insured funds, the more likely it is that market prices will reflect the bank outlook and the more likely market discipline is effective. Therefore, market discipline should force banks to maintain a low probability of default and consequently its impact may in turn arise from the different risk taking position and the capital behaviour. We therefore conduct our empirical analysis by focusing in whether market discipline does affect simultaneously banks' asset quality and risk and capital behaviour[3].

To investigate these hypotheses, we estimate capital and risk regressions.

---

[2] The effect is similar to that discussed in the deposit insurance literature. If depositors are protected by a guarantee, they will have fewer incentives to punish their bank for risk taking, reducing thereby market discipline.

[3] As we have reviewed in the first chapter, the relationship between bank capital and risk has been widely studied in the previous empirical literature adopting simultaneous estimations (Shrieves and Dahl (1992), Rime (2001)) but the purpose of this paper is slightly different as we concentrate on the impact of market discipline strength on the bank behaviour.

The first relationship is the capital regression:

$$K^{al}buffer_{it} = f\left(Risk_{it}, MD_{it}, Z_{it}\right) + u_{it} \quad (1)$$

Where i,t denote respectively the bank and the time.

The capital buffer (K^{al}buffer) is measured as the "excess-capital to risk-weighted asset" ratio.

We choose to use the capital buffer rather than the level of actual capital since, as shown earlier; most European banks hold a capital to asset ratio well above the required minimum level defined by the present capital adequacy regulation[4].

The risk is exogenous in year t since it is largely determined by decisions in previous years. Particularly, the risk arising from a bank's loan portfolio is not easily changed over one year. Capital on the other hand, can be adjusted in consequence over one year by changing the dividends policy distribution, by issuing new equity or by retaining earnings.

The bank asset risk is expected to have a positive effect on capital buffer as prudent banks, would hold a bigger capital buffer if they take on more portfolio risk.

Since asset risk is difficult to assess, we use a broad set of variables found in the literature to capture different aspects of risk in banking which will be detailed in the next section.

Market Discipline (MD) is the main variable of interest in this regression. Controlling for risk and other exogenous factors such as the bank size, bank type, the position of economic cycle[5], we expect a positive effect of market discipline, if effective, on capital buffer.

The second relationship is the risk regression:

$$RISK_{it} = g(K^{al}buffer_{it}, MD_{it-s}, Z_{it-s}) + v_{it} \quad (2)$$

In order to measure the default risk from measures of asset risk, it is important to take into account the amount of capital hold by the bank as an independent variable.

Moreover, the components of market discipline and other exogenous variables are expressed in lags since it is assumed that the risk position of the bank is dictated by its long term strategy. For instance, risky assets cannot be liquidated and replaced by more liquid assets before maturity. Furthermore, the realisation of an increase in underlying asset risk could take time thus indicating ex post credit risk.

[4] Banks must hold a "capital to risk adjusted asset" ratio of minimum 8 per cent except English banks for which the minimum regulatory ratio is of 9%.

[5] There are generally 2 distinct reasons why capital levels should change over time. The first relates the change in the riskiness of the bank portfolio and the subsequent need to provide a cushion to absorb such risks. The second relates to intertemporal arbitrage. As we have demonstrated in the first empirical investigation, economic cycles are likely to affect the level of capital held.

II. Variables of interest

2.1. Independent variables

The main independent variable of the analysis is the market discipline component.

Hereafter, we describe the set of factors that are likely to establish the strength of market discipline.

2.1.1. MD (safety net)

The first component likely to weaken market discipline is the safety net from which can benefit the banks. This safety results in explicit guaranties (depositor insurance) and implicit guaranties (bail-out policies and supportive attitude). For instance, the deposit insurance scheme in place in a country may affect the extent of market discipline. A credible deposit insurance system would reduce the incentives of depositors to monitor banks and therefore the degree of market discipline[6].

We use as explicit guaranties an index of the depositor protection across countries similar to the one used in our second paper which is inspired from Demirgüç-Kunt and Sobaci (2000) and Demirgüç-Kunt and Detragiache (2002).

The deposit insurance index (DEPINS) is defined as the sum of values taken by the following dummies:

Depins1= 1 if there is no coinsurance, =0 otherwise

Depins2=1 if coverage is slightly limited, =0 if strongly limited

Depins3= 1 if the prime is not risk adjusted, =0 otherwise

Depins4= 2 if the insurance is funded only by the government, =1 if by banks and the government, =0 if by banks only.

Depins5=2 if the insurance fund is managed by banks only or by a private manager, = 1, if by a public actor and a private actor, =0 if by the government only.

Due to the way we have constructed the index, we expect market discipline to be weaker and moral hazard incentives to be stronger the higher is the value of the index DEPINS.

Regarding the bail out guaranties, we first analyse their effect inside the safety net and than outside the safety net.

Inside the safety net: there is an extensive empirical literature examining the effect of bail-out policies on the risk-taking of the protected banks. As argued by some analysts of Fitch IBCA (Andrews *et al.* (2002, p 1)) "…whether or not banks default on their financial commitments is often a function not only of their intrinsic creditworthiness but also of the readiness and capacity of some outside agency, usually the state, either to support them by some form or subsidy, perhaps based on a guarantee, and/or

[6] Of course, deposit insurance systems are designed to protect small depositors and to avoid systemic crises. If depositors know that their funds are safe, they will not have an incentive to withdraw their deposits from their bank when they see another bank fail. Consequently, deposit insurance, at the same time lowers the probability of systemic bank runs.

to rescue them it they get into trouble." From this perspective, Hoggarth *et al.* (2003) examined the correlation between the Fitch Support Ratings and the average capital ratio and found a strong negative correlation, which is consistent with the hypothesis that a greater likelihood of official support reduces the appropriate (negative) influence of market discipline on bank risk taking.

As for the theoretical literature, it confronts two theses.

From the point of view of **market discipline**, public guaranties reduce market discipline because creditors anticipate the bank bail-out and therefore have lower incentives to monitor its risk-taking. This behaviour tends to increase the protected bank moral hazard.

From the point of view of **charter value,** public guaranties affect the bank risk taking behaviour through their effect on bank margins and charter values[7]. Charter values are shown, since the pioneer works of Keeley (1990), to decrease the incentives for excessive risk taking because the threat of losing future rents discourages risk-taking.

Hence, the net effect of public bail-out guaranties on the risk-taking of protected banks is somewhat ambiguous and depends on the superiority of the two channels: higher risk taking is expected only if the market discipline effect dominates the charter value effect[8].

Implicit guaranties are difficult to measure. In our empirical analysis, we adopt a similar method than the one used by Gropp *et al.* (2004) and Nier and Baumann (2006) by making use of the external support ratings published by Fitch IBCA and Moody's rating agencies. The support rating ranges from 1 (certain bail-out) to 5 (very unlikely bail out)[9].

The exhibit 1 and 2 (annex) provide the definition of "support" rating as well as the description of the different classes of support ratings provided by rating agencies.

Rather than using these support ratings as assigned on the scale from 1 to 5, we choose to construct a dummy variable (p_i) which takes the value 1 for the very likely support (rating 1 and 2) and the value 0 for a very unlikely support (rating 3, 4 or 5).[10] To avoid a large restriction of the sample size, all remaining private banks not rated are assigned a support rating of 0 and all public banks are assigned a support rating of 1.

Using this specification, the market discipline is weaker when $p_i=1$

---

[7] Government bail-out guarantees result in higher charter value for protected banks that benefit from lower refinancing costs.

[8] See Cordella and Yeyati (2003) and Hakenes and Schnabel (2004) for a more clear comprehension of the two channels effects.

[9] Moody's adopted in 2007 a new refined methodology called the Joint Default Analysis (JDA) that places less weight on non-contractual (typically uncertain) external support, with the goal of bringing deposit and debt ratings closer to financial strength measures. The idea is to evaluate potential support in a *sequential* process in which each support provider is assessed for its capacity and willingness to support the bank. The support framework identified four sources of potential external support for banks, each representing one step in the sequential JDA support framework: 1) Support from a parent (operating company or family group), 2) Support from a cooperative or mutualist group, 3) Support from a regional or local government, and 4) Systemic (i.e. national government and/or central bank) support. See rating methodology (2007, March).

[10] Gropp *et al.* (2007) have translated the ratings into bail-out probabilities (p_i) on the basis of standard credit matrix transition matrices for non financial corporate. This method was privileged in order to calculate the market share of insured competitor banks (MSI).

Outside the safety net: it is widely maintained that public guaranties to a subset of banks distort competition. Recently, Gropp *et al.* (2007) have shown that such competitive distortions may provoke higher risk-taking by those banks not covered by the policy. The theoretical argument behind is that lower refinancing costs will induce the protected bank to behave more aggressively. This increases competition and pushes the protected bank's competitors towards higher risk taking. Accordingly, we are interested here in the effect of competitive distortion due to the protection of competitor banks. Therefore, we use the constructed variables of Gropp *et al.* (2007), that measure the distortion of competition due to the protection of competitor banks at the country level, which is named the "market share of insured competitor banks" MSI_{-i}.[11] It is constructed as the overall value of all banks in a given country of:

$$MSI_{-i} = \sum_{j \neq i} p_j \frac{a_j}{A} = p_{-i} \frac{A_{-i}}{A}$$

$$A = \sum_i a_i \quad , \quad p_{-i} = \sum_{j \neq i} p_j \frac{a_j}{A_{-i}} \quad \text{and} \quad A_{-i} = A - a_i$$

Where a_i represents the total assets of bank i, a_j represents the total assets of a competitor bank j and p_j represents the average bail-out probability of a bank's competitors based on standard credit matrix transition matrices for non-financial corporates (for example a support rating of 2 is assigned a bail-out probability of 0.9).

The main hypothesis is that the higher the protected competitors' aggregate market share is, the higher will be the competitive distortion. Therefore, a higher MSI by country induces a higher bank' risk-taking.

2.1.2. MD (Funding)

As suggested earlier, the effect of market discipline ought to be stronger the higher the amount of uninsured funding. We measure the amount of uninsured funding of a bank as the ratio of deposits due to banks to total deposits of the banking system (BANKDEP). This choice is motivated by the fact that inter-banking are free of insurance schemas and that the lending bank is likely to be subject to the same kinds of chocks to risk and profitability as the borrowing banks.

The mandatory subordinated debt proposals which have emerged to provide the incentive for the exercise of market discipline by preventing issuers banks from taking on too much risk[12] would also

[11] Gropp *et al.* (2007) also adopted a more sophisticated version that uses the complete rating information (Financial strength rating, Individual rating, Issuer rating, etc) of all banks to construct the MSI. Since results are almost the same for the two methods, I choose to adopt the measures obtained from the simplest. Note also that the variable MSI varies not only across countries but also across individual banks within countries because the bank itself is always excluded from the calculation.

[12] Direct market discipline occurs when higher default risk leads to increases in the risk premium demanded by potential sub-debt creditors. Since this increases the bank's cost of raising capital, there is an incentive to limit

be a relevant tool of market discipline, but we did not use it because subordinated debts are a component of the tier 2 capital ratio and using the growth rate of the amount of subordinated debt issued by the bank would automatically have an amplifying effect on the bank capital.

2.1.3. MD (disclosure as a supervisory tool)

In order market discipline of banking institutions to be effective, the pillar 3 of Basel II emphasizes that banks must be sufficiently transparent; that is banks must provide a sufficient amount of accurate and timely information regarding their conditions and operations to the public. Improved public *ex ante* disclosure of such information would lead to increased transparency and therefore to *ex ante* response of market actors when riskier positions are taken and not, after losses have occurred guarantying hence the effectiveness of market discipline. The use of disclosure indices has been popularised by La Porta *et al.* (1998). Cordella and Yeyati (1998) and Boot and Schmeits (2000), emphasised the commitment effect of bank disclosure. Bushman and Smith (2003) offered a survey of researches on disclosure. More recently, Nier and Baumann (2006), in a cross-country study, found that greater information disclosure induce banks to hold larger capital buffers leading to lower default risk. The idea is that banking institutions, like all firms, are monitored by their customers, trade counterparties, and investors in their securities. When they disclosure their risk-profile, they will therefore get penalised for choosing higher risks.[13] The last survey of Basel Committee on Banking Supervision (BCBS (2003b)) reported the disclosure practices of internationally active banks.

The proposals of disclosure requirements consist of qualitative and quantitative information in three general areas: corporate structure, capital structure and adequacy, and risk management. Consequently, measuring the amount of information available is a hard task. For this purpose, we construct several measures of disclosure.

The first quantitative indicator is drawn on a previous study of Nier and Baumann (2006). It synthesises disclosure based not only on Fitch IBCA Bankscope Information but also on quarterly regulatory reports such as the bank-level Call Reports that are publicly available.

Indeed, the reports contain information regarding bank balance sheets and earnings and also a number of the bank's risk profile dimensions. For instance, the gross credit risk exposures must be reported in disaggregated form by exposure type such as loans or off-balance-sheet exposures, by geographic region, by industry or counterparty type, and by residual contractual maturity. Impaired loans and past-due loans also must be reported by geographic region and industry type. For market risk, the quantitative disclosures must include capital requirements for interest rate risk, equity risk, foreign

---

excessive risk taking. Indirect discipline occurs when a change in a bank's default risk reduces the secondary market price of SD. Since these price movements act as a signal of the market perception of the bank solvency, supervisors and market participants could use this information to control the bank activities (Bliss (2001), Caldwell (2007), Pop (2005)).

[13] Market discipline could not work however, whenever investors do not know the risk profile of the bank, and it is weakened if the amount of information available is limited.

exchange risk and commodity risk. We present in the table A0 (annex), a summary of 17 categories used to construct the composite Disclosure Index named (DISC1).

It is defined as: $DISC1 = \frac{1}{17}\sum_{i=1}^{17} S_i$ where each sub-index S_i can be related to one or more sources of risk. For all sub-indices, we assign 0 if there is no entry in any of the corresponding categories and 1 if there is at least one informed category. Then, the composite index will range between 0 and 1.

The second one is an ordinal variable (DISC2) which measures the degree of aggregated information disclosure for banks across countries using the "pro-disclosure" answers in section 10 of a survey on regulation and supervision (World Bank (2007)).

As for the quality of information disclosed, we consider that rated banks by a major rating agency are more transparent then the unrated banks and hence help the market discipline. Indeed, these firms are allowed to incorporate inside information into the assigned ratings without disclosing specific details to the public. This process makes the investors more informed about the bank. Many studies provide evidence on the superiority of information contained in ratings and explain the reason why firms usually pay for the ratings (Kliger and Sarig (2000)). We therefore construct a first binary indicator variable (RAT) which takes 1 if the bank is rated by any of the major rating agencies (S&P, Moody's or Fitch IBCA) and 0 otherwise.

Also, agreements between banks and their supervisors, such as formal enforcement actions and cease-and-desist orders, oblige banks to disclose specific steps bank management must undertake to external auditors that independently conduct annual statutory audits of the accounts of a bank as well as the bank's compliance with accounting procedures and *best practices*. This should provide the supervisor with an additional assurance that the accounts of a bank provide a true and fair view of the bank's financial position.

To control for this form of disclosure, we construct a second binary variable that represents the "qualification" of the bank account at each year. An "unqualified" account is the one that auditors have judged as non problematic and of good quality. Therefore the variable (UNQUALIF) takes 1 if the bank account is considered as of good quality and 0 otherwise. An unqualified account is likely to reinforce the disclosure process.

Other accounting ratios can reflect the bank opacity-or inversely transparency- based on the bank balance sheet structure. In theory, opacity comes from the intermediation function of banks and is often approximated by the ratio of loans to total assets. Besides, because liquidity is essential for market signals to transmit accurate information, the extent to which liabilities are market funded is crucial. Therefore the proportion of market funding on the liability side of the balance sheet is also, in several studies, a determinant variable. The hypothesis is that the more the bank activity is

concentrated on credits[14] and the lower is the proportion of market funding, the less is the bank transparent. We use the ratio of bank credits over total assets (CRED) and the ratio of market funded liabilities such that bonds and subordinated debts (MARK) designed by total balance sheet less deposits less stock equity over total assets.

The variable MARK takes 1 if the ratio of the considered bank is higher than the median level and 0 otherwise.

2.1.4. The ownership structure influence

Finally, the main novelty of this approach stands in adding the ownership structure of the bank as a key element of market discipline. Recent turmoil in financial markets following the announcement of heavy losses by major banks on exposures to mortgage-backed securities has reinvigorated an ongoing debate on whether banks are properly governed. Little is known however about how the bank private governance arrangements, including those covering its ownership and management structure, combine with national regulations to determine bank performance and stability. For the purpose of our paper, we are interested in assessing the "influence" of the ownership structure on the firm risk behaviour.[15]

We are not providing here an exhaustive literature review on the ownership structure but an overview of the most relevant issues related to the effects of ownership structure on bank behaviour.

A firm **ownership structure** can be defined along two main dimensions (Iannotta *et al.* (2007)). First, the degree of ownership **concentration**: firm's risk may differ because its ownership is more or less dispersed. Second, the **nature** of the owners: given the same degree of concentration, two firms may differ if the government holds a (majority) stake in one of them; similarly, a commercial firm, for example, with dispersed ownership is different from a mutual firm.

The relevance of firms' ownership structure has been extensively explored in the theoretical literature. As far as ownership concentration is concerned, an extensive literature has been investigating the insider-outsider shareholding aspect of governance.[16] Previous literature (since the works of Berle and Means (1932)) pointed-out that the separation of ownership and control may create conflicts of interests between owners and managers. As in any limited liability firm, stockholders of banks have incentives to increase risk by increasing leverage after collecting funds from bondholders and depositors (Galai and Masulis (1976)). In the other hand, managers may seek less risk taking than

[14] This variable reflects in fine the diversification degree of the bank. A highly diversified activity is generally associated to a better disclosure policy than for a less diversified one.

[15] The "monitoring" is the other aspect of market managers' discipline but the question about the relationship between ownership structure and this aspect of market discipline is weakly addressed in the empirical literature. As argued by Park and Peristiani (2007) and Auvray and Brossard (2008), the monitoring effect is closely related to the preference of shareholders for the option value (risk appetite) or inversely for the charter value (risk aversion).

[16] Other insights less investigated in the literature of the corporate governance showed various forms of control differentiated by type of investor (institutional investor, professional manager, etc) and not only by inside-outside ownership distinction (see for instance Demsetz and Villalonga (2001), Aglietta and Rebérioux (2005) and Aglietta (2007)).

stockholders because they have bank-specific human capital or enjoy private benefits of control (Demsetz and Lehn (1985), Kane (1985)). Accordingly, these tensions between managers and owners, resulting from the separation between ownership and control might be mitigated when managers (officers and directors) hold large equity stakes. For instance, Jensen and Meckling (1976) argued that the agency costs of deviation from value maximization increase as managers' equity stake decreases and ownership becomes more dispersed. More recently, several papers (Saunders *et al.* (1990), Gorton and Rosen (1995), Houston and James (1995) found a significant influence of managers' ownership concentration on risk taking, although no consensus exists on the sign of this relationship.

Mostly, the corporate governance literature argues that increasing stock ownership by managers and directors can be an effective control mechanism designed to reduce the moral hazard behaviour of firm managers. Banks with high levels of insider ownership have less agency problems between managers and shareholders, and therefore have less need for monitoring by outside directors. Another interpretation is that an increase in insider ownership increases the ability to influence board appointments, thereby reducing the presence of outside directors. From this perspective, Demsetz *et al.* (1997) showed that insider shareholding increased the risks taken of U.S. banks with low charter value during the relatively stable banking environment of the 1990s but not of the banks with high charter value. Similarly, Anderson and Fraser (2000) found that managerial shareholding in the U.S. is positively related to risk taking in the 1980s but negatively in the 1990s concluding that bank specific risks are significantly related to managerial holding. In the same line, Sullivan and Spong (2007) concluded, that in the early 1990s the decreasing risk effect is reinforced by the relative concentration of insider equities in manager's portfolios. Alternatively, their results suggest that an increasing weight of outside ownership also contributes to reduce bank risk taking.

The concentration degree of ownership can also be perceived from the size of the shareholder.

From this perspective, the theorical works of Fama (1980) and Fama and Jensen (1983) stressed that the most efficient firm's shareholder structure is the one hold by diversified owners because the more investor's portfolios' risk are diversified the more the shareholders structures are dispersed and the more financial markets are efficient, providing therefore accurate information and a good monitoring. Inversely, Shleifer and Vishny (1986) argued that shareholders with large voting and cash-flow rights have correspondingly greater power and incentives to shape corporate behaviour than smaller owners. In contrast, a shareholder with a little stake in the firm has weak incentives to engage in the monitoring of managers since he supports all the costs of monitoring while getting only a small fraction of the benefits (the typical free rider problem) [17]. Therefore, firms with block-holder ownership are expected to have less agency problems, and the need for alternative control mechanisms is reduced. In a related paper, Laeven and Levine (2008) showed that cash-flow rights by a large owner are generally associated with greater bank risk but this effect is much weaker in economics with

[17] These findings are also consistent with Tirole (2006) concluding to the high incentives of large owners to carry out an effective monitoring of managerial behaviour.

stronger shareholder protection laws. This finding supports the view that an effective legal system reduces the need for a large shareholder to advance the objectives of shareholders.

Another mechanism designed to mitigate the moral hazard behaviour of managers is monitoring by the board of directors (See Baysinger and Butler (1985), Rechner and Dalton (1991), Yermack (1996) and Bhagat and Black (1999, 2002)). Most importantly, for the board to be effective in carrying out its task of monitoring, it has to be independent of the management team. Therefore, it is argued by a number of academicians and professionals that the presence of directors who are not employees of the firm may enhance the effectiveness of the board of directors in monitoring managers, and improving firm value. The rationale behind is that outside directors are more likely to defend the interests of outside shareholders. Fama and Jensen (1983) argued that outside directors have the incentive to act as monitors of management because they want to protect their reputations as effective and independent decision makers.

Finally, the largely shared wisdom regarding the optimal board size is that the higher the number of directors sitting on the board the less is performance. Jensen (1993) states that "Keeping boards small can help improve their performance". When boards get beyond seven or eight people they are less likely to function effectively and are less easy for the CEO to control. Since smaller boards are considered as better monitors for managers (Jensen (1993)), the presence of more outside directors on larger boards may be interpreted as evidence that when the board gets larger, there is more need for outside directors. If bankers "believe" that outside directors are better for monitoring managers, they will compensate for the lack of monitoring by larger boards by increasing the proportion of outside directors. This may be seen as a sign of good governance in banks with high levels of insider equity ownership.

Regarding the nature of owners, the property rights hypothesis (Alchian (1965)) suggests that private firms should perform more efficiently and more profitably than both governments' owned and mutual firms. From this perspective, Kwan (2004) compared profitability; operating efficiency and risk taking between publicly traded and privately held US bank holding companies. The author concluded that publicly traded banks tend to be less profitable than privately held similar bank holding companies, since they incur higher operating costs, while risk between the two groups is statistically indistinguishable. Ionnatta *et al.* (2007) concluded that government owned banks exhibit a lower profitability than privately owned banks, in spite of their lower costs but have poorer loan quality and higher insolvency risk than other types of banks. In the same vein, Micco *et al.* (2004) found that in industrial countries, the return on assets of public owned banks and similar private banks is not significantly different of that of private banks. Similarly, Berger *et al.* (2005) concluded that public owned banks in Argentina have lower long-term performance than that of private banks.

Consequently, direct market discipline mechanism[18], such as the one envisaged by the third pillar of Basel II, would not be effective in the case of underperforming or risky government owned bank benefiting from explicit or implicit government guarantees. Moreover, as pointed-out by Bliss and Flannery (2002), to be effective direct market discipline requires a firm's expected cost of funds to be a direct function of its risk profile. This in turn requires that the firm's management responds to market signals. Therefore, the existence of any ownership structure which (because of its specific internal or external incentives) prevents the management from reacting to market signals would, by the *direct* channel, undermine the effectiveness of market discipline architecture.

Using several components of corporate governance for both dimensions of ownership structure (i.e ownership concentration and nature of the owners) and board size, this study try to construct a more comprehensive framework of the factors influencing European bank risk taking and capital.

The variables retained to control for the corporate governance are:

INSOWN: is the percentage of equity owned by the company directors and top executive officers, including the CEO.

BLOCK: is the percentage of equity owned by persons and institutions that hold 5% or more of the company's equity.

BSIZE (board size): is the number of directors sitting on the board at the shareholders' annual meeting.

GVMT: 1 if the bank is more than 50% owned by the government, 0 otherwise.

This last variable is sometimes omitted from the regressions when the control variable "type of the bank" is used; this is to avoid correlation with government owned bank type.

2.2. RISK and CAPITAL measures

The bank default probability is simultaneously determined by its risk exposure and capital position. On the one hand, financial institutions are exposed to reductions in firm value due to changes in business environment. Typically the major sources of value loss are the credit risk, the market risk and the liquidity risk. On the other hand, banks need to meet regulatory requirements for capital. Accordingly, bank managers and owners must make a fundamental decision about how much equity to hold in the bank. This decision is important because equity provides a cushion to absorb loan losses or unexpected drops in net income.

2.2.1. Risk measures

The first set of risk measures examines a bank exposure to risk through its lending activities. The loan portfolio is indeed the major source of risk that the board of directors and management control by

[18] We refer to the definition of direct market discipline proposed by Flannery (2001), as the process whereby the market signals affect the economic and financial position of a firm.

establishing policies regarding lending, limiting the loan-to-asset ratio and limiting credit concentration among industries, loan categories, or geographic locations.[19]

We use a broad set of variables found in the empirical literature to capture different aspects of the asset risk as proxies of the cost of failure.

1- The ratio of non-performing loans to total assets. It refers to the stock of bad and doubtful loans and summarises the extent of credit risk the bank has taken in the past (NPL)

2- The ratio of loan loss provisions to total assets. It is proxies by the flow of new bad loans since banks would make provisions to cover new non performing loans. (LLP)

3- The ratio of risk-weighted assets over total assets according to the Basel I standards (RWA).

Second, because higher risk in the loan portfolio is offset to some extent by lower risk in other balance sheet accounts and higher risk in off balance-sheet accounts, it is important to assess the risk generated by off balance sheet and securitization items as financial innovation, resulting in the massive securitization of illiquid assets might engage banks in very risky activities. Indeed, it is today easy to liquidate a portfolio of illiquid credits (such as a combination of bank loans or mortgages) and package them into investor portfolios-ultimately opening the door to the credit market to poor quality borrowers-. The recent subprime crisis starting in the U.S. is the best illustrative example of bank fragility inherent to OBS liabilities. Strong bank capital base, while essential to avoid the collapse of the bank, was not sufficient to prevent the systemic effects of the sub-prime crisis.

Unfortunately, the exam of the banks annual financial reports does not allow to analyse the off balance sheet risk because of the lack of information regarding the size and the diversification degree of these items.

Instead, we believe that the liquidity of the bank, essential for market signals to transmit accurate information, could inform about the degree of prudence of the bank in consideration of its securitisation' activity. We therefore, introduce a measure of the bank liquidity.

4- The liquid assets over total assets is used to control for the liquidity risk of the bank (LIQUID).

Finally, it is useful to examine measures of the overall risk of the bank. The commonly used market based measures of bank risk are mainly the fluctuations of equity prices, the asset return volatility, the Tobin's q (Iannotta *et al.* (2007)) and the probability of default or the risk of insolvency reflected in the Z score (Boyd and Graham (1988), De Nicolò (2001), Iannotta (2006), Gropp *et al.* (2007)).[20]

5- To the extent that stock market data are available, we use monthly equity prices to derive the standard deviation of equity returns. The standard deviation of equity returns can be decomposed into

[19] The bank must also control risk associated with other balance sheet items. It is exposed to risk associated with access to funds, commitments to the cost of fixed assets, and interest rate fluctuations, but this risk is marginal compared to the credit risk

[20] This last type of risk measure combines the income fluctuation, capitalization, and average profitability and then produces a unique survival likelihood index. As a robustness check of the results for risk and capital estimations, I use a Z-score of insolvency risk based on market data which resumes simultaneously the capital and risk aspects.

idiosyncratic risk (IDIO) and systemic risk (BETA) and are estimated for each bank i at each year t via the market model regression such that:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

$$\Rightarrow \varepsilon_{it} = R_{it} - \left(\hat{\alpha}_i + \hat{\beta}_i R_{mt}\right) \text{ and } \beta_i = \frac{\text{cov}(R_{it,} R_{mt})}{\text{var}(R_{mt})}$$

The idiosyncratic risk is the standard deviation of ε_{it}

The systematic risk is β_i

2.2.2. Capital measure

For the capital measures, we included as mentioned earlier, the capital buffer ratio defined as the excess capital to risk-weighted asset.

2.2.3. Control variables

We also include some control variables that could influence the risk and capital choices of a given bank. We use bank-specific and country-specific control variables.

First, size is been shown to have a significant impact on the bank access to capital and consequently target capital level. Furthermore, the size of a bank may play a role in determining the bank's risk level through its impact on investment opportunities and diversification benefits. We include a size variable which is approximated by the natural log of total assets (LNSIZE). Larger banks are expected to hold smaller capital buffers relatively to the "too big to fail" hypothesis since they expect to be "bailed-out" if they are faced with difficulties. On the other hand, small banks might hold larger buffers due to their relative difficulty to access the capital markets.

Second, more profitable banks will find it easier to accumulate equity through retained earnings. We therefore include the bank's return on equity (ROE) as a variable controlling this effect. It is likely that the bank's return equity is positively associated to capital (Berger (1995)).

Third, we control for different types of business (commercial banks, savings banks, etc) by using bank type dummies.

At the country level, we control for the concentration in different market sectors by using the Herfindahl index (HERF), the sum of squared market shares. Concentration has been shown to influence the bank behaviour.

Finally, in order to control for macroeconomic conditions, we include a cyclical variable into the model in order to establish the magnitude and direction of the effect that the cycle has on the size of capital buffer and the risk position. This indicator is the deviation from real GDP growth that is the output gap (OUTGAP)[21].

[21] In order to control for the banking industry risk in each country, the aggregated ratio of non-performing loans over the total assets would be a relevant indicator. But, since many banks, within a country, do not disclosure the amount of non performing loans, this indicator would not reflect the true banking industry risk.

III. Data and descriptive statistics

The major data source is Bankscope database which contains balance sheet and other bank-specific information for a large number of banks from a variety of countries. Also, we have used the detailed annual financial reports of banks which are available from the web sites. Regarding bank specialisations, unlike earlier studies that focus in large listed commercial banks, we include commercial banks, cooperative banks, saving banks, real estate and mortgage banks, medium and long term credit banks as well as specialised governmental credit institutions in 12 European countries of the OECD union. The sample includes all listed banks of each country for which data is available.

In order to compute the idiosyncratic and systemic risk, we have used monthly series of equity prices and the main benchmark stock market index for each country from DataStream database. The table 1 (annex) summarizes the stock market indexes used in this study.

Ownership data come from a multiple data set that was compiled from bank examination reports, the World Bank survey on supervision and regulation (2007), Dafsaliens and the Guide of "Etats-majors" for French banks.

The treatment of the data revealed some dummied out observations. First, starting with a sample of 108 banks, we eliminate 11 banks because of missing data and 9 others because of the lack of ownership data for these banks or because they experienced a significant ownership change. Also, banks for which information on risk or/ and on capital were unavailable or of aberrant values are excluded from the initial sample. So that, the final sample included 88 banks. Almost 62.5% of the sample designs commercial banks, almost 17% designs cooperative banks, almost 8% designs Real Estate and Mortgage, almost 4.55% designs saving banks, 3.4% Medium and Long term credit banks and almost 7% designs specialized governmental credit institutions[22].

The table 2 (annex4) summarizes the distribution of the sample by country and by bank type and the table 3 summarises the descriptive statistics for the variables of interest.

The observation of the disclosure, as represented in the graph 1 and 2 (annex), shows different disclosure levels across countries. The Graph 1 reveals that European banks are disclosing on average the haft of their accounting information (8 indicators over 17) according to DISC1.The disclosure index DISC1 is the highest in Finland, Italy and Greece and the lowest in Austria, France and Ireland. It is medium in Netherlands, Portugal, Spain, Switzerland and United Kingdom.

The disclosure as reflected in the "pro-disclosure" answers of the bankers to the degree of information in the survey of the World Bank is the highest in Italy and United Kingdom and The lowest in Austria and France.

As for the implicit guaranties, we provide in the table 4 (annex), the distribution of the support rating over countries and over time. On average, 34% of the European banks in the sample have a support

[22] The number of observations for the different regression is variable dependently on the availability of information in variables included in the estimation. For instance, when the variable of risk related to NPL is used the sample is restrained to 52 banks.

rating ranging from 3 to 5 and the 66% others are more likely to be supported beneficing of a support rating of 1 or 2. The observations on the support ratings show that the support rating varies within countries and over time. All the 3 English banks of our sample are poorly supported while a high proportion of Austrian, French and Switzerland banks of our sample benefit of a good support rating. Finally the observation of the market share of insured competitors (MSI) including all banks in a given country shows a quite large variation across countries as represented in the graph 3 (annex). The MSI is the highest in Finland, Germany, Greece and Switzerland and the lowest in Austria, Ireland and Portugal. It is average in France, Italy, Spain and United Kingdom. As constructed by Gropp *et al.* (2007), a high value of MSI by country can derive from two sources: from a high share of publicly owned banks or from a high share of banks (particularly large banks) that are likely to be bailed-out for being for example too big to be closed. For instance, about two thirds of Spanish and English banks are likely to be bailed out even though there are no public banks in Spain and in UK. For British banks, this is not contrasted with the low levels of support at the bank level. Indeed, the recent government bail-out of Northern Rock bank (included in our sample) although it has a support rating of 3 as assigned by Fitch IBCA, meaning that it is unlikely to be supported in case of distress, is the most illustrative case of this issue. One explanation is that the government support is above all to protect the depositors from the bank failure and therefore to get away any systemic risk that could take place as a result of a bank run while at the bank individual level, the support rating does not necessarily include the government support of bank bondholders and is also dependent of the support degree of other allies such as the shareholders.

In the next section, we will estimate the effects of these factors on European banks' capital and risk behaviours.

IV. Models specification and results

In order to evaluate the impact of market discipline components on the bank behaviour, we use two equations that reflect the bank risk position and the capital safety level.

4.1. Individual Model of bank capital

We start by estimating a basic model of bank capital buffers and then examine the impact of market discipline in a second step.

As estimation method, we adopt the random effects feasible GLS estimator (FGLS) for many reasons. First, it estimates the error variance-covariance matrix assuming that the error follows a panel specific autoregressive process.[23] Second, the FGLS estimator controls for the error heteroscedasticity and difference in the coefficient autocorrelation across banks. This was approved by the Hausman and Breusch-Pagan tests that suggest random effects specification. This approach is adequate to the model

[23] Formally, the error are assumed to follow a process of the form : $\varepsilon_{it} = \eta_i \varepsilon_{it-1} + \nu_{it}$

as some of market discipline variables of interest (DEPINS, p_i, RAT) do not vary across time and can not be analysed using a fixed effects approach. A fixed effects specification ignores cross-sectional variation in market discipline variables, which for the purpose of testing our hypotheses is an important dimension.

We include both measures of risk based on equity market (IDIO and BETA) and the credit and liquidity risk as described earlier (LLP, NPL, RWA, LIQUID).

As expected, IDIO and BETA have a positive relationship with capital. The LLP is taken to reflect current credit risk as measuring expected loan losses next period. It has also a positive and significant relationship with the capital buffer. European banks are revealed to keep larger capital buffer if they expect to make large loan losses in the next period.

Contrary, the NPL ratio which measures the realised credit risk has a negative effect on bank capital. Hence, current and past bad loans trigger provisions and than lower the size of the capital buffer. Finally, the more the bank assets are liquid, the less are the incentives to increase capital buffers.

As for control variables, the variables LNSIZE, ROE, HERF and OUTGAP are significant as shown by the results summarized in the table 5 (annex).

Market discipline Impact

To estimate the market discipline effect on the capital bank behaviour, we were confronted to endogeneity problem. Indeed, some components of market discipline depend themselves on bank capital. For instance, Banks that hold little capital buffer may have to issue more bank deposits to their assets funding. This likely negative relationship between capital and the bank deposit ratio would obscure the positive relationship expected to arise from the incentive effect of interbank market discipline. Similarly, bank disclosure may be determined with the bank capital choice. In order to ensure that it can find sufficient investor demand, a bank that would like to raise more equity, may need to be highly transparent. Therefore, eliminating this effect would facilitate the interpretation of a positive coefficient of disclosure on bank capital buffer.

In order to take account of the endogeneity problem, we have adopted instrumental variables for the estimation procedure (2SLS). In the first step, the endogenous variables (the ratio of bank deposits and the disclosure index) are regressed on a number of bank level exogenous variables. These variables are the loan ratio (LOAN), the return on equity (ROE), the return on assets (ROA), the cost to income ratio (CIR) and the market share (MS).In addition, we have included a country level dummy and a year trend and also their interaction to control for cross-country and cross time dimensions.

In the second step, the dependent variable is predicted on the base of only the information used by the first stage regression. The instrumental variables and results of the first stage regressions are detailed in the table A1 of the appendix and the table A2 gives the correlation coefficients between the fitted values from the first stage regression and their actual values.

The table 6 summarises the impact of each component of market discipline on the capital buffer. The first column presents the effects of the insurance variables. Deposit insurance (DEPINS) and the market share of insured competitors (MSI_{-i}) are significant and negatively related to capital buffer. This result supports the fact that the existence of generous deposit insurance systems discourages the European banks to hold high capital buffers and increase their moral hazard incentives. These incentives are shown to be higher when the market share of insured competitor is large. Similarly, the support (p_i) is shown to be negatively related to the capital level hold by European banks.

The second column reports the effect of the funding component of market discipline (BANKDEPFIT). This variable shows a significant positive effect on the capital buffer indicating the disciplining effects of interbank deposit market.

The last column shows that the disclosure variables (DISCFIT1, DISC2, RAT, UNQUALIF, MARK) have an expected positive impact on the capital buffer except the CRED variable which reflects the size of credit activities, has a negative sign. This finding emphasizes the fact that the more the bank activity is based on credit, the high is its opacity and the less is the capital buffer. Alternatively, banks more exposed to the market have higher pressure to increase their capital buffer.

As for the effects of the ownership structure, "the percentage of equity owned by persons and institutions that hold 5% or more in the company's equity" (BLOCK) are positively related to the capital buffer hold by European banks suggesting that the more the ownership is concentrated on a large owner the more the bank is capitalised.

Table 7 (annex) presents the preferred model to assess the impact of market discipline as a global feature on the European bank capital buffer.[24]

To the extend that major bank-level variables (P_i, BANKDEP, DISC, MARK) range between 0 and 1, the coefficient on each of these variables can be interpreted as the absolute change in the capital ratio resulting from a unit increase in the market discipline variable. The coefficient on BANKDEP about 3.13% means that a bank which has a bank deposit ratio of unity would have a capital ratio of 3.13% higher than a bank that has no interbank deposits. Inversely, a coefficient of 2.35% on P_i variable could mean that banks with likely government support have capital ratios about 2.35% lower than those without government support. Moreover, the coefficients on disclosure and debt market ratios are somewhat small (respectively 1.09% and 1.2%) but suggest that banks increase their capital buffer when they largely issue non insured securities such as bonds or subordinated bonds (market funded liabilities) and improve the quality of the information assigned to the market.

4.2. Individual model of bank risk

[24] Note that it's not possible to include the support rating (P_i) and the variable RAT at the same time, since, by construction any bank which has a support rating has a value of 1 on RAT. Therefore, to avoid perfect colinearity between the two variables, we only use the support dummy in the preferred specification.

The risk regression estimates the relation between a single risk variable, capital and the market discipline components accordingly to the equation (2).

As for the capital regression, the GLS procedures are likely to be more significant than the OLS estimation. This choice is driven by the diagnostic tests on the residuals of basic pooled OLS regressions on the risk ratios that suggest non-normal residuals. Moreover, the presence of heteroscedasticity and autocorrelation in the residuals has dictated the choice of a heteroscedastic AR (1) error structure.

It is important to note that the disclosure index and the funding variables still endogenous with respect to the risk (correlated with the error terms). Here again, we instrument these variables similarly to the capital specification method.

The table 8 represents the results of the market discipline impact on different measures of risk position.

First of all, the sign of the capital buffer ratio is somewhat puzzling and depends on the specification of risk. We note a negative relationship between the capital buffer and the risk measured by NPL and a positive relationship with the LLP ratio, the RWA ratio, the liquidity risk and the idiosyncratic risk. This funding can be explained by two facts. On the one hand, a high ratio of NPL is generally associated with higher provisions which in turn reduce capital. On the other hand, high capital buffers would be also associated to higher asset risk and generate higher loan loss provisions in the future.

Moreover, the control variable OUTGAP is negatively related to the loan loss provisions and to liquidity and positively to the RWA indicating that bank provisions and liquidity decrease after an economic downgrade and at the same time banks undertake more risky assets.

The dummy related to the type of the bank shows that commercial banks and public owned banks detain higher risky assets unlike saving and cooperative banks that have lower asset risk and more loan loss provisions.

The variable LNSIZE shows that larger banks have higher LLP but also higher risk on their assets, high volatility on their market returns and less liquid assets.

The banking market concentration (HERF) decreases asset risk measured by RWA and increases the loan loss provisions. In contrast, it decreases liquidity and the volatility of market returns.

Market discipline impact

Regarding the impact of market discipline, findings show that deposit insurance systems has a significant positive effect on the asset risk and on the volatility of markets returns.

Own bail-out probability, when significant, has a negative effect on the NPL but also on the loan loss provisions and on the liquidity of the bank.

The bail out of bank competitors is also determinant of the own bank risk. The results show that it has a negative impact on the loan loss provisions and the liquidity of the bank and increases the risky assets and the equity market volatility.

The bank deposit ratio (unsecured liabilities) increases the loan loss provisions of the bank but at the same time increases the risky assets and the equity market volatility. Hence, one can not argue that the interbank market exerts an effective market discipline on bank's risk.

As for the disciplining effect of the disclosure, results show that transparency has a significantly negative impact on risk taking measured by the RWA and on the idiosyncratic risk of the equity market. It has also a positive impact on the LLP and the liquidity of the European banks in the future. Inversely, it increases the non performing loans in the future. This funding could be driven by the fact that banks in transparent banking systems are obliged to disclose problems loans in the next period. However, this result must be interpreted prudently because of the small size of the sample in this specification.

Rated banks are taking risky assets but at the same time increasing their provisions on loan losses.

The market based liabilities has a negative impact on the bank liquidity and on the equity market risk and a positive impact on the loan loss provisions hold by European banks. Market funding is therefore shown as a disciplining form of the bank behaviour.

Finally, the ownership structure has a significant impact on the risk behaviour of the bank. The "percentage of equity owned by the company's directors and top executive officers" (INSOWN) has a disciplining effect as it generates a less risky market returns and more loan loss provisions. Therefore, the involvement of managers in the ownership of European banks is associated with better loan quality, lower asset risk and lower insolvency risk. Contrary to the theoretical evidence and some of the empirical literature that argue that bank risk is generally higher in banks that have large owners with substantial cash-flow rights, the variable BLOCK is however not shown in our estimation to influence the risk taking of large European banks. Our measure of ownership concentration might be biased by the presence of indirect ownership that is not always taking into account in the reported information.

The coefficients on the market discipline variable could give also some information on the economic significance of a change in market discipline components. For instance, banks that increase their bank deposits of unity increase their risky assets by about 3.4% and their LLP of about 1.36%. Similarly, banks increase their own risky assets of about 2.3% and decrease their LLP of almost the same percentage when they know that their competitors can be bailed by the government. The disclosure index shows that banks providing more information about their risk have risky weigh assets and risky returns lower of about 3-5% than for banks disclosing less information.

Results on the impact of the capital on risk and vice versa are sometimes puzzling particularly regarding the relationship between the capital buffer and the liquidity of the bank. In the capital specification, the buffer is negatively related to the bank liquidity while in the risk specification, the buffer is positively related to the bank liquidity and therefore it is not possible to conclude about the relationship between the liquidity risk behaviour and the capital position of European banks. Moreover, the capital is a choice variable for the banks and endogenous on the risk choice. Assuming

that a bank targets its default probability, the equity ratio could be determined by the amount of risky assets in a bank's balance sheet, against which it holds capital in order to reach its probability of default.

Hence, we investigate, in the next step, the impact of the market discipline using a simultaneous estimation of the risk and the capital specifications.

Moreover, while our results point to the general effectiveness of market discipline, it is interesting to know under what conditions market discipline is weakened. This interrogation is motivated by the fact that implicit guaranties (the support rating) and uninsured deposits on the interbank market are shown to increase the moral hazard behaviour of banks (low capital buffer and high risk taking). In addition, the results could be biased by high levels of implicit guaranties from which benefit banks (a proportion of 66%) that weaken the disciplining effect of some other factors such that the uninsured liabilities. In this respect, Gropp *et al.* (2004) showed that subordinated debt spreads have predictive power in explaining bank failure for banks which benefit of Fitch IBCA public support rating of 3 and higher but do not have any impact on the banks with a support rating of 1 or 2 (high probability of bail out).

We test this hypothesis by subdividing the sample into 2 subgroups of banks: banks which have a public support rating of 1 and 2 and banks which have a support rating of 3 and higher.

4.3. Simultaneous estimation of bank behaviour

Results summarized in the table 9 show significant effects of the market discipline on the bank behaviour and overall the beneficial effects of market discipline do not appear weaker for banks which enjoy high implicit government guaranties than those banks which do not enjoy such guaranties. However, the use of uninsured liabilities is shown to discipline weakly supported banks as they appear responding to the increase of interbank deposits by increasing their capital and lowering their risk contrary to the highly supported banks that are shown to increase capital but also risk subsequently to an increase in their uninsured liabilities.

Moreover, banks that benefit of implicit guaranties are still increasing their asset risk and reducing their capital in presence of explicit guaranties while the non supported ones are taking on less risk and at the same time on less capital buffer in the presence of explicit guaranties. These findings emphasize the existence of "too big to fail" issue and of moral hazard behaviour from supported banks. Therefore, results point out the fact that the presence of implicit guaranties undermines the effects of regulatory capital requirements that aim to limit the bank risk taking or to insure a positive relationship between capital and risk[25].

The question that remains however is whether banks that target high capital ratios and low risk levels are similarly influenced by market discipline than banks that target high capital levels and high risk levels. This issue was theoretically investigated by many authors including Décamps *et al.* (2003) and

[25] The positive and simultaneous relationship between capital and risk has been concluded by several studies (Shrieves and Dahl (1992), Ediz *et al.* (1998), Aggarwal and Jacques (2001), Rime (2001), Altunbas *et al.* (2004)). Others concluded to a negative relationship between capital and risk (Jacques and Nigro (1997), Van Roy (2003), Heid *et al.* (2004)).

Chiesa (2001). These authors demonstrated that banks that are close to insolvency are less influenced by market discipline than other banks. In the next section, we test the robustness of our results taking in account these effects.

V. Robustness checking

Overall, market discipline is effective for European banks but a question still obscure: banks that target lower solvency standards are they less or more influenced by market discipline than other banks? Moreover, at comparatively low levels of capital, do banks adopt different risk strategies? To answer this question, it is interesting to split the sample into two groups of banks with low capital and high risk (high default probability) and all other banks (medium or low default probability). Rather than doing that, we calculate the probability of default or the Z-score of European banks of the sample and split the sample into 2 groups according to the median default probability of the sample.[26]

There are different methods or calculation of the Z-score based on market values.

Boyd and Graham (1988), De Nicolò (2001) and Ionnatta *et al.* (2007) calculate the Z-Score for the bank i and the time t such that:

$$Z_{it} = \frac{\hat{\mu}_{it} + \frac{E_{it}}{A_{it}}}{\hat{\sigma}_{it}}$$

Where $\hat{\mu}_{it}$ and $\hat{\sigma}_{it}$ are sample estimates (based on the monthly values of the return on assets R_{it}) of the mean and standard deviation of bank's i returns on assets at time t and $\frac{E_{it}}{A_{it}}$ is the time average on the market capital-to-asset ratio.[27]

More simply, Furlong (1988), Boyd and Runkle (1993), Bichsel and Blum (2002) and recently Gropp *et al.* (2007) calculate the Z-score on the basis of market returns such that: $Z = \frac{k + \mu}{\sigma}$

Where k is the equity ratio (book values), μ is the mean return and σ is the standard deviation of returns. Formally, the z-score could also be calculated on the basis of book returns but results in this case seem less reliable (Boyd and Runkle (1993)).

Similarly to this last group of authors, we choose the variance-equal weights method and calculate the log of Z-score (Ln (Z)) for each bank of the sample.

---

[26] Note that various weighting techniques are considered in the literature, including factor analysis, credit aggregate-based weights, variance equal weights, and transformations of the variables using their sample cumulative distribution function. In all cases, the indexes are rebased such that they range in value from 0 to 100, with 100 being the maximum historical value of the index.

[27] For further details on the variables used to measure the ln (Z) according to this method, the lector can see Iannotta *et al.* (2007).

In such a case, a higher level of Ln (Z) corresponds to a lower level of insolvency, i.e a lower probability of default when the Ln (Z) is higher than the median of the sample.

Results show that the bank deposit ratio seems significant to influence the insolvency risk of European banks with high default probabilities (positive sign) but the coefficient of the bank deposit ratio is much higher for banks with a medium or low default probability. This suggests that interbank market discipline works better for banks that are well capitalised and with low risk positions than for those that are close to insolvency. This finding is in line with Nier and Baumann (2006) for a large sample of European banks during the period 1993-2000.

The disclosure variables are significant and negatively related to the insolvency risk of the 2 subgroups. However, the incentive effects of the disclosure seem more important for banks that run medium and low default probability (higher coefficient) than for banks with high default probability. This funding must be taken with caution because the sample for banks with high default probability is relatively small, which would bias the regression's coefficients.

As for the disciplining effect based on the ownership structure, it appears that the INSOWN variable reflecting the involvement of managers in decision making influence the behaviour of banks that run medium and low default probabilities. Indeed, the significant and positive coefficient on INSOWN shows that the more the ownership is concentrated on equity owned by the company directors and top executive officers, including the CEO, the less are interest conflicts between managers and shareholders and the lower is the default probability of the bank. Inversely, the implication of managers in the decision process of banks running high default probability induces a negative effect perhaps due to the lack of transparency between the two actors when the bank is in difficulty. This last result is also problematic and less reliable as the size of the sample for this regression is small.

VI. Conclusions and policies implications

The paper aimed to examine empirically the strength of market discipline and its impact on the incentives of banks to limit their default probability. We construct 4 sets of components that reflect the strength of market discipline. First, the degree of explicit and implicit government guaranties inside and outside the safety net. Second, the amount of uninsured liabilities in the bank's funding strategy. Third, the degree of transparency of the bank via the quality and the quantity of disclosed information and fourth the impact of the ownership structure of the firm behaviour.

We used different specifications that reflect the default probability of the bank. Capital specification tested the impact of market discipline on the behaviour of European banks in adjusting their capital buffer, controlling for factors of risk and others variables likely to affect bank capital. Risk specification tested the impact of market discipline on the behaviour of European banking in choosing their risk position, given capital buffers and other factors driving bank risk. Results for these specifications are consistent with the fact that disclosure and concentration of the ownership affect the

incentives of banks to limit their insolvency risk (high capital buffer and low risk position). A higher share of uninsured liabilities induces an increase of the capital buffer and at the same time an increase in risk taking. However, implicit and explicit guaranties (the bail-out and deposit insurance) are associated to less capital buffer and higher risk position increasing therefore the insolvability risk of European banks. When looking to the simultaneous regressions of capital and risk and separating the global sample into two sub-samples of supported and non-supported banks, results show that capital and risk move similarly reducing the insolvency risk of the bank. But, the effects of market discipline are stronger for non-supported banks since explicit guaranties and a high share of uninsured liabilities reduce the risk taken by these institutions. However, moral hazard increases for supported banks. In fact, for banks that benefit from a government support, interbank discipline is not effective and explicit guaranties lead to higher insolvency risk. The disclosure and the concentration of ownership have strong disciplining effects on all European banks confirming the fact that transparent banks have lower incentives to take risk and are maintaining high capital buffer.

The split of the sample into banks with high default probability (low z-score) and low default probability (high z-score) shows that the interbank discipline seems to work better for banks with low default probabilities. Also, disclosure seems working better for banks with low default probability. This last result supports the fact that for banks close to insolvency, disclosure is less effective than for banks well operating.

The ownership concentration seems to have a higher disciplining effect on banks that run a low default probability. This result is in line with the conclusions of Iannotta *et al.* (2007) that a higher ownership concentration is associated with better loan quality, better asset risk and lower insolvency risk.

To sum up, the results emphasize the importance of enhancing market discipline through more disclosure. The existence of implicit guaranties and explicit guaranties at the same time seems to weaken the disciplining effect of uninsured liabilities on the interbank market and increase moral hazard of supported banks. However, weakly supported banks that are beneficing of generous deposit insurance scheme interestingly undertake less moral hazard behaviour as they respond by reducing risky assets. In addition, some forms of market discipline are less effective for banks close to insolvency. This funding emphasizes the importance of minimum capital requirements as a condition for the effectiveness of market discipline. Finally, the ownership structure seems to have an impact on the behaviour of listed European banks but further research related to this question is needed to validate the finding to larger samples.

All in all, our estimations run on the period 1999-2005 emphasize the importance of disclosure in enhancing market discipline but of course the covered period does not take into account neither the efforts the Basel Committee in implementing the pillar 3 of Basel II aiming to emphasize disclosure in many EU countries, since 1 January 2008 via the Capital Requirements Directive, nor the new International Financial Reporting Standards (IFRS) effective since January 2005.

The actual context of financial markets turbulence has increased calls for improving disclosure mostly motivated by a desire to reduce market uncertainties. Indeed, the subprime episode has raised many questions about the disclosure on risks associated to securitisation products and losses related to subprime mortgage defaults that are often enclosed in very complex positions. From this perspective, it is widely maintained today that the disclosure on uncertain credit fundamentals may be insufficient to restore market confidence. While the bank disclosure on liquidity would substitute for the difficulties to correctly assess the risk position of the bank, the turmoil of the last period has been clearly shown that current information gaps are large and that current practices in this area may suffer form severe shortcomings as these practices have contributed to severe liquidity shortages in short-term money and interbank markets, triggering repeated monetary interventions by central banks worldwide. In a special issue on liquidity within the Financial Stability Review, Praet and Herzberg (2008) illustrated the difficulties inherent in assessing credit institution's liquidity risk, mainly when the public information is limited and/or difficult to assess.

More generally, the liquidity shortages experienced in 2007 and early 2008 raise the question of whether the market really can play a disciplining role as regards banks' liquidity management. According to our results, the answer would be yes as we have shown that increase of uninsured liabilities (liquidity) on the interbank market would reduce the risk taking of mainly less supported banks. The Northern Rock's wholesale funding market concentration risks were, presumably, well known to the market, but it nevertheless failed to punish the bank with higher borrowing costs in earlier years. The usefulness of market discipline and disclosure as regards liquidity availability thus remains an open issue. Besides, it worth stressing that the pillar 3 on Basel II requirements regarding the securitisation exposures disclosure are quite limited, as they mostly focus on banks' total outstanding exposures that have been securitised and less on the corresponding capital charge. In addition, there are little concrete mandatory disclosure requirements on liquidity. Disclosure on the quantification of liquidity risk is limited and does not explicitly reveal the size of liquidity buffers. The International Financial Reporting Standards (IFRS) aiming to present a more accurate picture of financial positions at any given time and effective since 1 January 2005 in EU would probably improve recognising and measuring financial assets and liabilities of banks during the next years.

Annexes

Table 1: Market indexes of the countries in the sample

Countries	Market Index
ITALIE	MIB 30
FRANCE	CAC40
GERMANY	DAX 30
SPAIN	MADRID GENERAL SE
UNITED KINGDOM	FT100
NETHERLANDS	AEX INDEX
PORTUGAL	DJTM PRG
GREECE	ATEX COMPOSITE
AUSTRIA	DS (General Index)
SUIZERLAND	DJTM SWISS
IRLAND	DJTM IRD
FINLAND	DJTM FLDS

Table 2: Total sample distribution by country and by bank type

COUNTRY		BANK TYPE					
	TOTAL	COMMERCIAL	COOPERATIVE	SAVINGS	REAL ESTATE AND MORTAGE	MEDIUM &LONG TERM CREDIT	SPECIALISED GOVERMENTAL CREDIT INSTITUTIONS
AUSTRIA	7	2	3	1	1	0	0
FINLAND	2	2	0	0	0	0	0
FRANCE	13	4	7	1	1	0	0
GERMANY	13	8	0	0	3	1	1
GREECE	7	6	0	1	0	0	0
ITALY	16	8	5	1	0	2	0
IRELAND	3	3	0	0	0	0	0
NETHERLANDS	1	1	0	0	0	0	0
PORTUGAL	2	2	0	0	0	0	0
SPAIN	10	10	0	0	0	0	0
SWITZERLAND	11	5	0	0	1	0	5
UNITED KINGDOM	3	2	0	0	1	0	0
TOTAL	88	55	15	4	7	3	6

Table 3: Summary statistics of the default risk and market discipline variables during the period 1999-2005

Variables	Mean	Min	Max	Overall Std.Dev	Between[28] Std. Dev	Within[29] Std.Dev
Risk and Capital Variables						
Asset quality risk						
Ratio of non-performing loans (%)	3.26	0.00	38.74	6.31	4.42	5.11
Ratio of loan loss reserves (%)	102.98	10.87	576.69	25.35	16.73	20.02
Ratio of risk-weighted assets (%)	71.36	0.12	152.34	21.61	14.83	19.03
Asset return volatility[30] (σROA)	0.96	-11.94	18.63	1.85	1.12	1.74
Liquidity risk						
Ratio of Liquid assets (%) (LIQUID)	25.12	4.92	115.62	12.91	11.08	9.21
Market risk						
Idiosyncratic risk	6.21	0.01	12.18	5.22	3.15	2.64
Systematic risk (β_i)	37.20	9.76	93.81	32.07	27.24	18.10
Capital						
Capital Buffer (%)	5.6	0.21	23.5	4.04	3.54	1.85
Market discipline variables						
Implicit and explicit guaranties						
Deposit Insurance Index	2.75	0	5	0.86	0.86	0
Support rating (P_i)	0.66	0	1	0.43	0.35	0.12
Market Share of insured competitor (MSI) (%)	0.645	0.3	0.87	0.16	0.16	0
Funding						

[28] The between standard deviation ignores any variation over time.
[29] The within standard deviation ignores any cross-sectional variation.
[30] Here are reported the values of the ROA level.

Bank Deposit Ratio	23.62	3.08	57.93	28.11	26.35	9.34
Disclosure						
Quantity						
Disclosure bank Index 1	0.48	0.31	0.67	0.1125	0.092	0.0361
Disclosure Country Index 2	10.25	8	12	1,28	0.54	0
Net Loans to Total Assets ratio (CRED) (%)	61.64	19.10	88.73	23.04	18.32	10.15
Market funded resources (MARK) (%)	19.72	13.87	31.99	24.99	22.61	15.03
Ownership Structure						
Concentration						
% equity owned by persons and institutions that hold 5% or more of the company's equity (BLOCK)	48.57	0.01	100	29.83	13.68	0.15
% Equity owned by the company directors and top executive officers, including the CEO. (INSOWN)	25.17	0	76.21	18.03	11.42	3.76
% directors not currently employed by the company (OUTDIR)	49.54	27.83	81.03	21.02	18.91	8.32
Number of directors sitting on the board at the shareholders' annual meeting (BSIZE)	10.53	5	22	6.07	5.16	3.72
Control variables						
Total assets (LNSIZE) millions EURO	76634.57	99566.49	1002503	187855.51	154638.87	574810
Return on equity (ROE)	13.17	-15.61	28.54	18.66	15.24	11.87
OUTPUT GAP (%) (OUTGAP)	2.28	0.8	3.4	8.12	6.51	4.23

Table 4: Distribution of the support rating by country during the period 1999-2005

COUNTRY	**SUPPORT**	**19999**		**2000**		**2001**		**2002**		**2003**		**2004**		**2005**	
		0	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**
AUSTRIA	7	1	6	1	6	1	6	2	5	1	6	1	6	1	6
FINLAND	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2
FRANCE	13	3	10	5	8	4	9	4	9	3	10	3	10	3	10
GERMANY	13	6	7	6	7	5	8	5	8	5	8	5	8	4	9
GREECE	7	2	5	2	5	2	5	2	5	3	4	3	4	3	4
ITALY	16	7	9	7	9	7	9	7	9	7	9	7	9	7	9
IRELAND	3	1	2	1	2	1	2	1	2	1	2	1	2	1	2
NETHERLANDS	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
PORTUGAL	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2
SPAIN	10	5	5	5	5	5	5	4	6	4	6	4	6	4	6
SWITZERLAND	11	2	9	2	9	2	9	2	9	2	9	2	9	2	9
UNITED KINGDOM	3	3	0	3	0	3	0	3	0	3	0	3	0	3	0
TOTAL	88	30	58	32	56	30	58	30	58	29	59	29	59	29	59

Table 5: Capital buffer and risk relationship: FGLS regression model with heteroscedastic panels

	Random effects FGLS
	Dependant variable: CBUFF
NPL	-0.15260**
LLLP	0.12871**
RWA	0.13238***
LIQUID	-0.02310***
IDIO	0.07541**
BETA	0.17335*
Year	0.00563***
OUTGAP	0.00174**
LNSIZE	-0.03611**
HERF	-0.07541***
ROE	0.01823***
Nbre of observations	1528
Log Likelihood ratio	1113
R^{2bar}	0.589

*** Statistical significance at 1% level

** Statistical significance at 5% level

* Statistical significance at 10% level

Table 6: Market discipline effect: instrumental FGLS regression model: capital specification

	Random effects FGLS		
	Dependant variable: CBUFF		
	Insurance	**Funding**	**Disclosure**
CONS	1.832573***	1.742154***	1.23488**
Risk variables			
NPL	-0.163822***	-0.219419**	-0.08631**
LLLP	0.183945**	0.093728**	0.278455*
RWA	0.203782***	0.140351***	0.180391***
LIQUID	-0.194907*	-0.072860**	-0.061028**
IDIO	0.09350**	0.141989*	0.047321
Market discipline variables			
DEPINS	-0.073410***		
P_i	-0.082910**		
MSI_{-i}	-0.137225**		
BANKDEPFIT		0.075110***	
DISCFIT1			0.251929**
DISC2			0.133655*
RAT			0.003831**
UNQUALIF			0.039212*
CRED			-0.006311**
MARK			0. 00114*
GVMT			-0.193746
INSOWN			0.085973
BLOCK			0.102549**
BSIZE			0.003893
Control Variables			
HERF	-0.066382**	-0.192541***	-0.023956**
YEAR	0.002384***	0.003921***	0.003115***
OUTGAP	0.094558**	0.114703**	0.101942**
LNSIZE	-0.003937**	-0.039256***	-0.153950**
ROE	0.184764***	0.120835***	0.085832***
N° observations	987	1332	1011
Log likelihood ratio	2027	2685	3720
R^{2bar}	0.53	0.44	0.67

*** Statistical significance at 1% level, ** Statistical significance at 5% level, *Statistical significance at 10% level

Table A0: Categories of sub-indexes used for the construction of DISC1

Items	**Sub-index**	**Categories**
Assets		
Loans	S_1 : Loans by maturity	Loans and advances ⟨3 months, Loans and advances 3-12 months, Loans and advances ⟩ 1 year
	S_2 : Loans by counterparty	Loans to Group Companies, loans to other corporate, Loans to banks.
	S_3 : Problem Loans	Total problem banks
	S_4 : Problem loans by type S_5: risk weighted assets	Overdue/ restructured/ Other non performing Total of risk weighted assets
Other Earning Assets	S_6 : Securities by type	Treasury bills, other bills, Bonds, CDs, Equity investments, other investments
	S_7: Securities by holding purpose	Investment, trading
Liabilities		
Deposits	S_8: Deposits by maturity	Demand, Savings, Sub 3 months , 3-6 months, 6monthes-1 year, 1-5 years, + 1 year
	S_9: Deposits by type of customer	Banks/customers/ Municipal, Government
Other funding	S_{10}: Money market funding	Total Money Market Funding
	S_{11}: Long term funding	Convertible Bonds, Mortgage Bonds, Other Bonds, Subordinated debt, Hybrid Capital
Income statement		
	S_{12}: Non-interest income	Net Commission Income, Net fee Income, Net Trading income
	S_{13}: Loan Loss Provisions	Total Loan loss Provisions
Memo lines		
	S_{14}: Reserves	Loan loss reserves (memo)
	S_{15}: Capital	Total capital ratio, Tier 1 ratio, total capital
	S_{16}: Off-balance sheet (OBS) Items S_{17}: liquid assets	OBS items Total liquid assets

Table A1: Results of the first stage estimation with Instrumental Variables (IV): GLS regression

	DISC1	**BANKDEP**

CONS	-13,7348**	-10,9310***
ROE	0,069372***	-0,82609**
ROA	0,182661***	-25,0738**
CIR	0,120371**	0,17275
LOAN	-0,084639**	0,06921*
LIQUIDR	0,033028*	-20,8683*
MS	-0,173936**	-0,12744**
BANKTYPE	0,084725**	13,9712**
DUMCOUNTRY		
DUMIT	11,8411***	34,9137***
DUMFR	18,9478***	87,980***
DUMGER	-6,04832**	54,0291**
DUMSPN	20,8103***	25,18**
DUMUK	-4,93752**	46,2415**
DUMNTHS	6,70287***	-16,4839**
DUMPGL	-13,8571**	8,27901**
DUMGRC	-18,0993*	-65,9180**
DUMAST	-7,28439**	-23,7307***
DUMBLG	34,0873**	-11,1963**
DUMSWS	-10,8462***	92,2732**
DUMIRL	76,9328**	-5,72927**
DUMFLD	-48,8359*	-8,24318**
DUMYEAR*DUMCOUNTRY		
DUMITY	0,27461***	0,14964***
DUMFRY	-0,49921**	-0,00830***
DUMGERY	-0,19758***	0,05749***
DUMSPNY	-0,07389***	0,98341***
DUMUKY	0,18233**	-0,0736***
DUMNTHY	-0,08754**	-0,02912***
DUMPGLY	0,74930***	-0,02038***
DUMGRCY	0,00493***	0,18305***
DUMASTY	0,04739***	-0,02903***
DUMBLGY	-0,09478***	-0,11390**
DUMSWSY	-0,11872***	0,01831**
DUMIRLY	-0,02933**	0,07298**
DUMFLDY	-0,10359**	-0,00457**
Number of observations	3720	3532
R^{2bar}	0,4801	0,5190

*** Statistical significance at 1% level ** Statistical significance at 5% level * Statistical significance at 10% level

Table A2: Correlation coefficients between the fitted and the actual values of DISC and BANKDEP

	DISCFIT	**BANKDEPFIT**
DISC	0,4298	---
BANKDEP	---	0,5661

Table 7 IV GLS Preferred regression with panel data

	GLS 1 (IV)
Dependant variable CBUFF	
CONS	
Risk variables	
NPL	-0,07531***
LLLP	0,18902***
RWA	0,20816***
LIQUID	-0,02879**
IDIO	0,06290**
Market discipline variables	
DEPINS	-0,11285***
P_i	-0,023551***
MSI_i	-0,06011***
BANKDEPFIT	0,031357**
DISCFIT1	0,006381**
DISC2	0,01097***
CRED	-0,08435**
MARK	0,01217**
BLOCK	0,03122**
CONTROL VARIABLES	
HERF	-0,07532**

YEAR	0,04295***
OUTGAP	-0,16511**
LNSIZE	-0,00897***
ROE	0,04926***
N° observations	583
Log likelihood ratio	1864
R^{2bar}	0,57

Only significant variables are retained in this regression

*** Statistical significance at 1% level ** Statistical significance at 5% level * Statistical significance at 10% level

Table 8: IV GLS regression model with panel data for risk specification: impact of market discipline components in conjunction

GLS For all MD CATEGORIES		**DEPENDENT VARIABLE**			
	NPL	**LLP**	**RWA**	**LIQUID**	**IDIO**
CONS	0,58746***	0,29802***	0,38103***	0,37320***	0,15601***
Capital variable					
CBUFF	-0,08272***	0,13638**	0,12945**	0,31441**	0,07634**
Market discipline variables					
DEPINS	0,19005*	-0,06522	0,09651**	0,04783	-0,05721**
P_i	-0,42061**	-0,29370**	0,00538	-0,08126**	0,01840
$LMSI_{-i}$	0,01903**	-0,03848*	0,02360**	-0,07038**	0,03104**
LBANKDEPFIT	0,05801	0,0136*	0,03430**	0,00703	0,09238**
LDISCFIT1	-0,06362**	0,04017*	-0,03874*	0,03171***	-0,05760***
DISC2	-0,00644	0,04480*	0,28371	0,01739**	0,10382
RAT	0,0712	0,05309*	0,01020**	0,00512	0,02900
MARK	0,003821**	0,012902**	0,01923	-0,00282*	0,03934*
INSOWN	-0,38115***	0,14973***	0,08205**	0,02205	-0,17380*
BSIZE	2,4039	-3,02381	3,0297	2,99423	1,28474
Control variables					
OUTGAP	-0,81138***	-0,17492***	-0,04847**	-0,19208***	-0,23095
LLNSIZE	-0,09207	0,00263***	0,01320***	-0,04115*	0,02800*
HERF	-0,00181	0,03460**	-0,05511**	-0,08013**	0,09520*
COMMERC	0,03248**	0,02844	0,01563***	-0,02459	0,02033
COOP	-0,00327***	0,18021**	-0,02933**	0,02051	0,01743
SAV	-0,18341***	0,03866***	-0,10858	0,12903***	-0,13421
REAL	-0,00774**	0,01893	0,03211***	0,09384**	0,00487**
MLTCR	0,02901*	0,02040**	0,01080**	-0,01717***	0,01498**
GVMT	-0,01552**	0,02272	0,19481**	0,28103	-0,00302**
N° observations	421	571	483	602	611
Log likelihood ratio	1028	2382	1705	1144	1203
R^{2bar}	0,34	0,41	0,36	0,55	0,28

*** Statistical significance at 1% level** Statistical significance at 5% level *Statistical significance at 10% level

Table 9: Results of the simultaneous equation estimation for the banks of the sample

	Support =1 and 2	**Support 3, 4 and 5**
Dependant variable : CBUFF	**GLS with IV (all MD components)**	
CONS	0.32189**	0.14017***
Risk variables		
NPL	0.01402**	-0.02730**
LLP	-0.03928**	-0.01504*
RWA	0.00832*	-0.08915**
LIQUID	-0.14512*	0.10236
IDIO	0.02441**	0.03622*
Market discipline variables		
DEPINS	-0.01897**	-0.04190**
MSI_{-i}	-0.03230**	-0.00650*
BANKDEPFIT	0.01356*	0.01582**
DISCFIT1	0.09238*	0.04019**
DISC2	0.02310**	0.01270**
CRED	-0.00219*	-0.01503*
RAT	0.05821*	0.03781**
MARK	0.00172**	0.05928*
INSOWN	0.02983*	0.07043**
CONTROL VARIABLES		
HERF	-0,09210*	0.05610*
YEAR	0.1033**	0.28031**
OUTGAP	-0.04871***	-0.02520*
LNSIZE	-0.01059*	-0.06173**

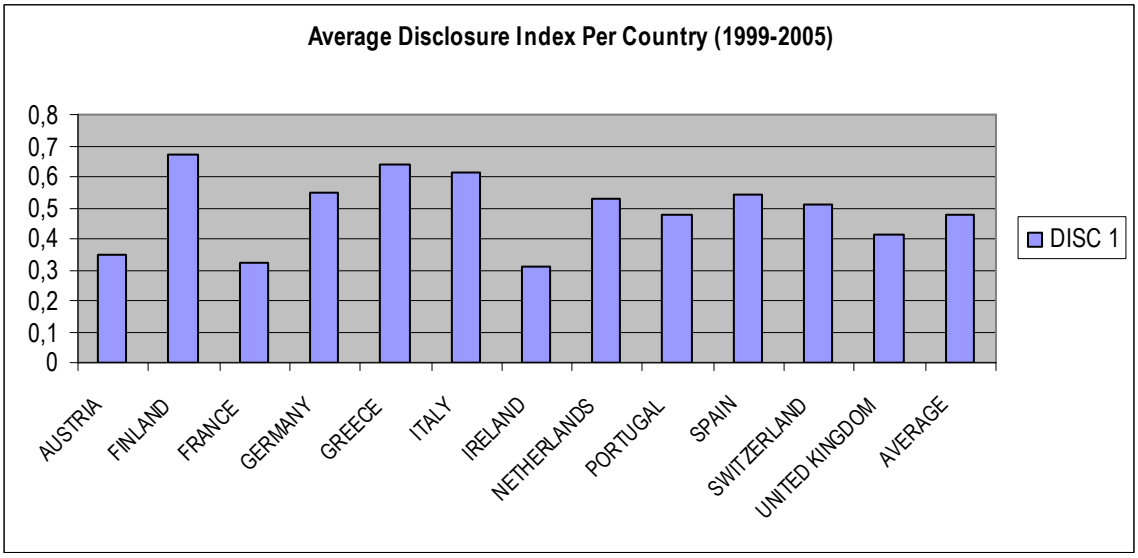
ROE	0.01237*	0.04912*
Adjusted R^2	**0.471**	**0.378**
Dependant variable : Risk (RWA)	**GLS with IV (all MD components)**	
CONS	0.28721***	
Capital variable CBUFF	0.01139**	
Market discipline variables		
DEPINS	0.03351*	-0.01257**
$LMSI_{-i}$	0.01181**	0.04910*
LBANKDEPFIT	0.05962*	-0.02210*
LDISCFIT1	-0.07279**	-0.06901*
DISC2	-0.01938*	-0.01548*
RAT	-0.00147*	-0.00663*
MARK	0.01535***	0.02915*
INSOWN	-0.02206**	-0.01501*
BSIZE	3.02931	1.28540
Control variables		
OUTGAP	-0.02508**	-0.01835*
LLNSIZE	0.01149*	0.02405*
HERF	-0.01102**	-0.01720*
COMMERC	0.05940*	-0.02819*
COOP	-0.03933*	-0.01261*
SAV	-0.01272*	-0.02081*
REAL	0.00205*	0.05300*
MLTCR	0.03904**	0.01273*
GVMT	0.01057**	0.01615*
Adjusted R^2	**0.341**	**0.353**

*** Statistical significance at 1% level ** Statistical significance at 5% level *Statistical significance at 10% level

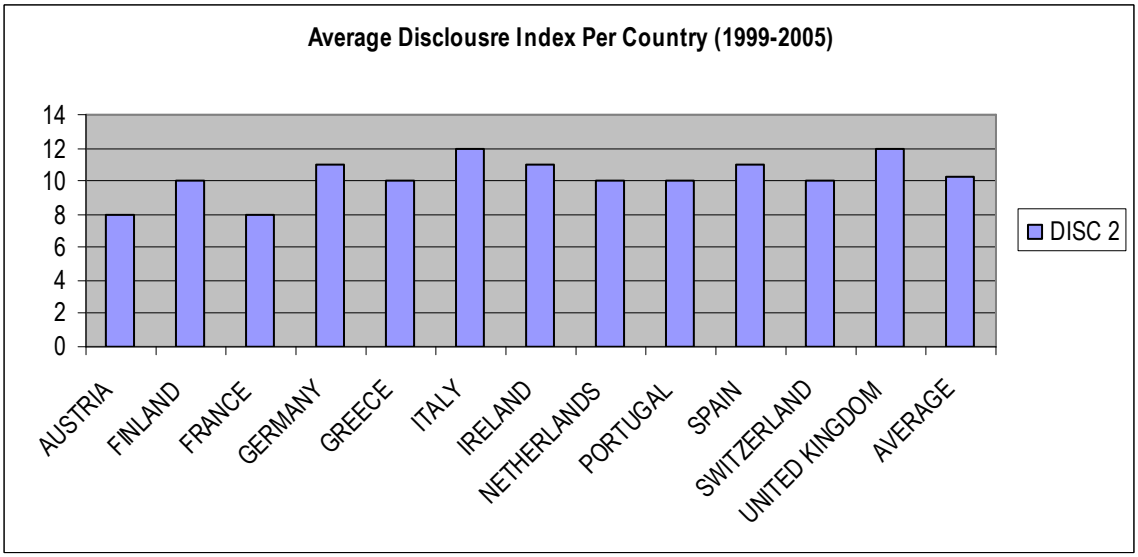
Index of variables used in the regressions

Variable Name	Description	Data source
CBUFF	**Capital buffer : actual capital minus regulatory capital**	**Bankscope**
DEPINS	**Composite index of deposit insurance**	**Bankscope**
P_i	**Support probability**	**Bankscope and Gropp *et al* .(2007)**
$LMSI_{-i}$	**Lagged market share of protected competitors**	**Gropp *et al.* (2007)**
LBANKDEP	**INTERBANK DEPOSITS OVER TOTAL LIABILITIES**	**Bankscope**
DISC1	**DISCLOSURE INDEX**	**OWN CONSTRUCTION**
DISC2	**DISCLOSURE INDEX at country level.**	**WORLD BANK (2007)**
INSOWN	Percentage of equity owned by the company directors and top executive officers, including the CEO.	**BANKSCOPE, reports**
BLOCK	Percentage of equity owned by persons and institutions that hold 5% or more of the company's equity.	**BANKSCOPE, reports**
OUTDIR	Proportion of directors not currently employed by the company. It is calculated as the number of outside directors divided by the total number of directors.	**BANKSCOPE, reports, DAFSALIENS**
BSIZE	Number of directors sitting on the board at the shareholders' annual meeting.	**Bankscope, reports, DAFSALIENS**
GVMT	1 if the bank is more than 50% owned by the government, 0 otherwise.	**Bankscope, reports, DAFSALIENS**
NPL	**Non performing loans**	**Bankscope, reports, DAFSALIENS**
LLP	**Loans loss provisions**	**Bankscope, reports**
RWA	**Risk weight assets**	**Bankscope**
LIQUID	**Liquid Assets over total assets**	**BANKSCOPE**
OUTGAP	**OUTPUT GAP**	**OECD DATASOURCE**
IDIO	**Idiosyncratic risk**	**DATASTREAM**
BETA	**SYSTEMATIC RISK**	**DATASTREEM**
HERF	**HERFENDHALL INDEX (CONCENTRATION)**	**Own construction**
MS	**Market share : assets over total assets of the banking system**	**Bankscope**

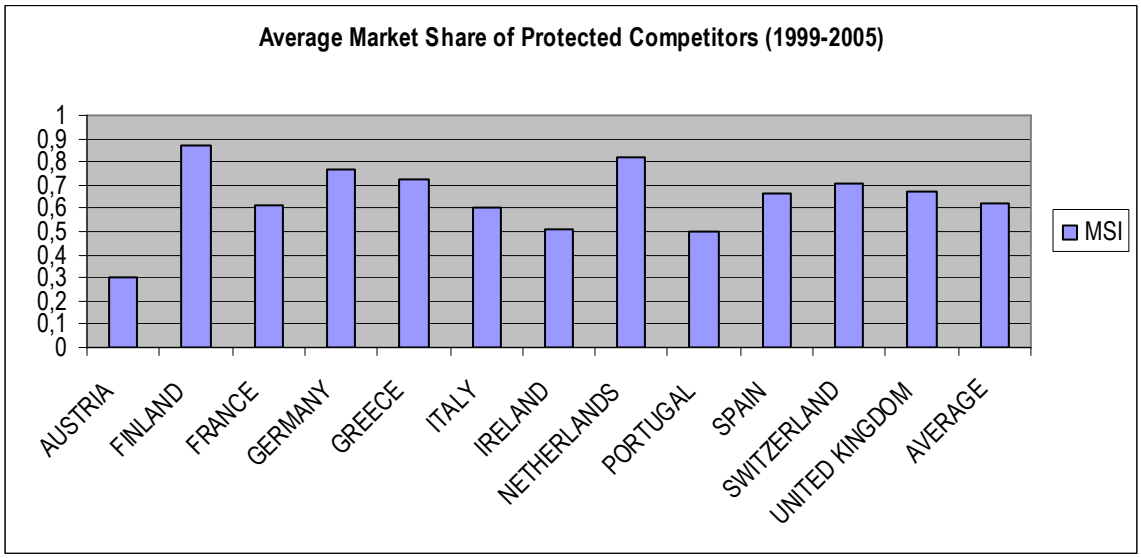
Graph 1



Graph 2



Graph 3


Average Market Share of Protected Competitors (1999-2005)
1
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
AUSTRIA
FINLAND
FRANCE
GERMANY
GREECE
ITALY
IRELAND
NETHERLANDS
PORTUGAL
SPAIN
SWITZERLAND
UNITED KINGDOM
AVERAGE
MSI

Bibliography

Alchian, A.A (1965): “Some economics of property rights”, Il Politico, 30, 816-829.

Basel Committee on Bank Supervision (2003b): "Public Disclosures by Banks: Results of the 2001 Disclosure Survey.", Basel Committee Publications No. 97,May.

Berger, Allen, N. (1991): “Market Discipline in Banking”, Proceedings of a Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, May, pp. 419-437

Bearle , A.A., Jr., Means, G.C (1932): “ The Modern Corporation and Private Property” Macmillan, New York.

Bhagat, Sanjai and Bernard Black (1999), “The Uncertain Relationship between Board Composition and Firm Performance”, Business Lawyer Vol. 54, pp. 921-963.

Bhagat, Sanjai and Bernard Black (2002), “The Non-Correlation between Board Independence and Long-Term Firm Performance, “Journal of Corporation Law Vol. 27, pp. 231-273.

Bliss, Robert R. (2001): “Market Discipline and Subordinated Debt: A Review of Some Salient Issues”,mimeo, Federal Reserve Bank of Chicago

Bliss, Robert R. and Flannery, Mark J. (2002): ”Market Discipline in the Governance of U.S. Bank Holding Companies: Monitoring versus Influence”, *European Finance Review*, Vol.6, pp. 419-437

Boyd, John H. and David E. Runkle (1993): “Size and Performance of Banking Firms: Testing the Predictions of Theory,” Journal of Monetary Economics, 31(1), 47–67.

Boot, Arnoud W. A. and Schmeits, Anjolein (2000): “Marked Discipline and Incentive Problems in Conglomerate Firms with Applications to Banking”, Journal of Financial Intermediation, Vol. 9, pp. 240-273

Caldwell (2007): “Best Instruments for Market Discipline in banking”, Bank of Canada Working Paper, September

Cordella, Tito and Eduardo L. Yeyati (2003): “Bank Bailouts: Moral Hazard vs.Value Effect,” Journal of Financial Intermediation, 12, 300–330.

De Nicolò, G (2001): “Size, Charter Value and Risk in Banking: An International Perspective” FRB International Finance Discussion Paper No. 689

Demirguc-Kunt, Asli and Detragiache, Enrica (2000): “Does Deposit Insurance Increase Banking System Stability? - An Empirical Investigation”, mimeo, The World Bank

Demirguc-Kunt, Asli and Sobaci, Tolga (2000): “Deposit Insurance around the World: A Data Base”, mimeo, The World Bank

Demirgüc-Kunt A, J-Kane.E and Laeven.L (2007): Determinants of Deposit-Insurance Adoption and Design. NBER Working Paper No. 12862, January

Demsetz, R.S., Saidenberg, M.R., Strahan, P.E (1997): “Agency Problems and Risk Taking at Banks”, Staff, Reports, No. 29,Federal Reserve Bank of New York.

Evanoff, Douglas D. and Wall, Larry D. (2000a): “The Role of Subordinated Debt in Bank Safety and Soundness Regulation” in Proceedings to the 36th Annual Conference on Bank Structure and Competition.

Fama E.F., Jensen M .C (1983): “Separation of Ownership and Control”, Journal of Law and Economics, 26.

Flannery, J. Mark (2001) ‘The faces of «Market Discipline»,’ Journal of Financial Services Research 20,107-119

Gorton, G., Rosen, R (1995):"Corporate Control, Portfolio Choice, and the Decline of Banking", Journal of Finance, 50, 509-527.

Gropp.R and Vesala.J (2001): Deposit insurance and Moral hazard: Does the counterfactual matter?, ECB, working paper N°47.

Gropp.R and Vesala.J (2004): Deposit insurance, Moral hazard and market monitoring, ECB working paper N°302.

Gropp.R, Hakenes.H and Schnabel.I (2007): "Competition, Risk-Shifting, and Public Bail-Out Policies", SSER, February.

Hakenes. H and Schnabel.I (2004): "Banks without Parachutes – Competitive Effects of Government Bail-out Policies", Max Planck Institute for Research on Collective Goods, Preprint No. 2004/12.

Houston, J.F., James, C(1995): "CEO Compensation and Bank Risk: Is Compensation in Banking Structured to Promote Risk Taking?", Journal of Monetary Economics, 36, 405-431.

Iannotta,G, Nocera.G and Sironi.A (2007): "Ownership Structure, Risk and Performance in the European Banking Industry", Journal of Banking and Finance, Vol. 31, pp. 2127-2149.

Iannotta, G (2006): "Testing for Opaqueness in the European Banking Industry: Evidence from Bond Credit Ratings", Journal of Financial Services Research.

Jensen, M.C., Meckling, W (1976.): "Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure". Journal of Financial Economics, 3, 305-360.

Keeley,Michael C.(1990): "Deposit Insurance, Risk and Market Power in Banking", *American Economic Review*, Vol. 80, pp. 1183-2000

Kliger, Doron and Oded Sarig (2000): "The Information Value of Bond Ratings", Journal of Finance, Vol. 55 (6), pp. 2879-2902.

Kwan, S.H.,(2004): "Risk and Return of Publicly Held versus Privately Owned Banks", Federal Reserve Bank of San Francisco Economic Policy Review, 97-107.

La Porta, Rafael, Lopez-de-Silanes, Florencio and Shleifer, Andrei and Vishny, Robert W. (1998): "Law and Finance", Journal of Political Economy, Vol. 106, pp. 1114-1155.

Morck.R, Shleifer.A and VISHNY.RW (1988): "management ownership and market valuation, an empirical analysis", Journal of financial economics, 20, PP 293-316.

Nier and Baumann (2006): "Market discipline, Disclosure and Moral hazard in banking", Journal of financial Intermediation, vol.15, issue 3, pages 332-361.

Saunders, A., Strock, E., Travlos, N (1990): "Ownership Structure, Deregulation and Bank Risk Taking", Journal of Finance, 45, 643-654.

Stern, Gary.H (1999): "managing moral hazard with market signals: how regulation should change with banking", Federal Reserve Bank of Minneapolis Region 13, N°3, 28-33, 60-62

Yermack.D (1996): "Higher Market Valuation of Companies with A Small Board Of Directors", Journal of Financial Economic