BANK OF FINLAND
DISCUSSION PAPERS

10/2000

Ari Hyytinen – Tuomas Takalo

Financial Markets Department
31.8.2000

Enhancing Bank Transparency: A Re-assessment

SUOMEN PANKIN KESKUSTELUALOITTEITA • FINLANDS BANKS DISKUSSIONSUNDERLAG

Ari Hyytinen – Tuomas Takalo

Financial Markets Department
31.8.2000

Enhancing Bank Transparency: A Re-assessment

Ari Hyytinen, Financial Markets Department, Bank of Finland, P.O. Box 160, 00101 Helsinki, Finland. Email: Ari.Hyytinen@bof.fi, Tel. +358 9 1832111.

Tuomas Takalo, Economics Department, Boston University, 270 Bay State Road, Boston, MA 02215. E-mail: takalo@bu.edu, Tel: (617) 353 6824.

We thank Abjihit Banerjee, Sudipto Bhattacharya, Esa Jokivuolle, Heikki Koskenkylä, Klaus Kultti, Zvika Neeman, Juha-Pekka Niinimäki, Oz Shy, Otto Toivanen and participants in the FPPE seminar in Helsinki for perceptive comments.

ISBN 951–686–669–7
ISSN 0785–3572
(print)

ISBN 951–686–670–0
ISSN 1456–6184
(online)

Suomen Pankin monistuskeskus
Helsinki 2000

Enhancing Bank Transparency: A Re-assessment

Bank of Finland Discussion Papers 10/2000

Ari Hyytinen – Tuomas Takalo
Financial Markets Department

Abstract

Transparency regulation aims at reducing financial fragility by strengthening market discipline. There are however two elementary properties of banking that may render such regulation inefficient at best and detrimental at worst. First, an extensive financial safety net may eliminate the disciplinary effect of transparency regulation. Second, achieving transparency is costly for banks, as it dilutes their charter values, and hence it also reduces their private costs of risk-taking. We consider both the direct costs of complying with disclosure requirements and the indirect transparency costs stemming from imperfect property rights governing information and specify the conditions under which transparency regulation can (and cannot) reduce financial fragility.

Key words: information disclosure, market discpline, bank transparency, deposit insurance, financial safety net

Tulisiko pankkitoiminnan avoimuutta lisätä? Pankkien tiedonantovelvollisuussääntelyn tarkastelua

Suomen Pankin keskustelualoitteita 10/2000

Ari Hyytinen – Tuomas Takalo
Rahoitusmarkkinaosasto

Tiivistelmä

Pankkitoiminnan tiedonantovelvollisuussääntelyllä pyritään lisäämään markkinakuria ja siten vahvistamaan pankkijärjestelmän vakautta. Pankkijärjestelmällä on kuitenkin kaksi ominaisuutta, jotka saattavat heikentää tällaisen sääntelyn tehokkuutta. Ensinnäkin kattava pankkijärjestelmän turvaverkko saattaa vähentää tiedonantovelvollisuuden markkinakuria vahvistavaa vaikutusta. Toiseksi tiedonantovelvollisuuksien lisääminen aiheuttaa pankeille kustannuksia, mikä osaltaan vähentää pankkien kannattavuutta ja voi siten myös vähentää riskinottoon liittyviä yksityisiä kustannuksia. Tarkastelemme tässä selvityksessä sekä suoria tiedonantovelvollisuuden noudattamisesta syntyviä kustannuksia että epäsuoria kustannuksia, jotka syntyvät informaatioon liittyvien omistusoikeuksien määrittelemisen epätäydellisyydestä. Johdamme myös ehdot, joiden vallitessa tiedonantovelvollisuuden laajentaminen vahvistaa (ja ei vahvista) pankkijärjestelmän vakautta.

Asiasanat: tiedonantovelvollisuus, markkinakuri, pankkitoiminnan avoimuus, talletusvakuutus, pankkijärjestelmän turvaverkko

Contents

1 Introduction

The aim of a safety net for the banking sector is to reduce financial fragility. However, the existence of such a safety net entails a widely recognized moral hazard problem. Safety nets in general, and depositor insurance schemes (DISs) in particular, provide incentives for excessive risk taking by banks.[1] This concern about moral hazard has recently led to a novel idea regarding regulation. It has been argued that enhancing the transparency of the financial condition of banks would expunge the moral hazard problem by strengthening market discipline.[2] The argument is that claimants are the more responsive to changes in banks' risk profiles, the more comprehensive the available information on banks' financial condition. Stringent transparency requirements should thus deter banks from excessive risk taking. As discussion of the transparency argument has been rather informal, the main purpose of this article is to examine the validity of this argument in a stylized framework.

There is abundant evidence that weak transparency makes banks' asset risks opaque. Stock market participants including the professional analysts, such as Moody's and Standard and Poor's, encounter difficulties in measuring banks' creditworthiness and risk exposures (Poon, Firth, and Fung, 1999, Morgan, 1999, and Jordan, Peek, and Rosengren, 2000). And academics face the same problems.[3] It is not easy to interpret banks' accounting data (Beatty, Chamberlain and Magliolo 1995, Collins, Shackelford and Wahlen 1995, and Genay 1998) nor disclosures of banks' credit losses (Ahmed, Takeda and Thomas 1999, and US General Accounting Office 1994). Rochet and Tirole (1996) note that interbank lending complicates assessment of banks' actual liquidity and solvency ratios.

To enhance the transparency of banking sectors, various international institutions, such as the Basel Committee on Banking Supervision, G7 Finance Ministers, International Monetary Fund and the World Bank, have campaigned for improved accounting and disclosure practices (see eg Basel Committee 1998, 1999a, 1999b). Numerous scholars, such as Berlin, Saunders and Udell (1991), Edwards and Mishkin (1995), Bhattacharya, Boot and Thakor (1998), Rosengren (1998), Jordan, Peek and Rosengren (1999, 2000), and Heffernan (2000) also advocate a transparent banking system. Mayes (1997, 1998), and Mayes and Vesala (1998) regard transparency as an instrument for improving both domestic and

---

[1] There is a sizeable literature on the economics of bank regulation and design of safety nets. See Dewatripoint and Tirole (1994) and Bhattacharya, Boot and Thakor (1998) for general reviews. The link between moral hazard problems and the DIS is also well documented. Kane (1989), for instance, regards the US safety net and fixed-rate DIS as main reasons for the Savings and Loan crisis of the 1980s. Berlin et al (1991) provide a concise review of empirical literature on the DIS and banking problems. Their conclusion is that 'the moral hazard problem is operative and significant' (p. 738). Demirguc-Kunt and Detragiache (1998) find that an explicit DIS has increased the fragility of the banking system around the world.

[2] The concept of bank transparency is broad in scope. It refers to the quality and quantity of public information on a bank's risk profile and to the timing of its disclosure, including the bank's past and current decisions and actions as well as its plans for the future. The transparency of the banking sector as a whole also includes public information on bank regulations and on safety-net operations of the central bank (see eg Enoch et al 1997 and Rosengren 1998).

[3] As Kaminsky and Reinhart (1999, p. 476) put it, 'Indicators of business failures and nonperforming loans are also usually available only at low frequencies, if at all; the latter are also made less informative by banks' desire to hide their problems for as long as possible.'

international banking supervision. These calls for increased transparency seem to be well founded given the experience of recent banking crises around the world.[4]

A bank can be transparent to market participants both before and after investments are made in the bank. In the *ex post* sense, the degree of a bank's transparency determines the degree of information available to its claim-holders on the bank's financial condition. If it transpires that the value of a bank's assets is low, the bank's creditors, and particularly its uninsured depositors, may withdraw their funds. The threat of a bank run can then discipline bankers in their risk-taking (see eg Calomiris and Khan 1991, Carletti 1999, Chen 1999 and Niinimäki 2000).

Ex ante transparency implies that *potential* depositors and other creditors can appreciate a bank's financial condition prior to placing funds in it. This strengthens market discipline, because the better investors are able to evaluate banks' risk positions, the more risk-sensitive the banks' funding costs should be.[5] The supply of funds to a bank is also directly related to the perceived soundness of the bank. The contention that lower quality banks attract fewer uninsured deposits than higher quality banks has recently received sound empirical support (see eg Park 1995, Billet, Garfinkel, O'Neal 1998, Park and Peristiani 1998, Martinez Peria and Schmukler 1998, Goldberg and Hudgins 1999, and Jagtiani and Lemieux 2000). Despite its importance, the ex ante transparency and its effect on market discipline are seldom addressed in a clear conceptual framework. For this reason, these are the focus of this study, and in what follows, we equate transparency to its ex ante dimension.

Our main argument is that there are two elementary reasons why transparency regulation may be inefficient or even detrimental from the welfare standpoint. First, an extensive DIS or, more generally, an extensive financial safety net may prevent transparency regulation from reducing financial fragility. If deposits are fully insured, there is no market discipline, regardless of how transparent the banking system is. Second, achieving transparency is costly for banks, as it reduces their profits, and hence it also reduces their private costs of risk-taking. These costs can be divided to two broad categories.

- *Direct compliance costs* may arise because effective transparency necessitates public disclosure, ie providing market participants with accurate and credible information on banks, and because the provision of such informa-

[4] See Kaminsky and Reinhart (1999) for an excellent analysis of 26 banking crises in 20 countries from the 1970s to the mid-1990s. They also discuss the recent financial crises in East Asia. The link between financial crises and transparency is explicitly made eg by Summers (2000), who argues that promoting transparency is both the best way to prevent crises and an effective policy response to crises; by Jordan et al (1999), who suggest that transparency improves market discipline in crises; by Rosengren (1998), who argues that transparency reduces the costs of crises; and by Kiander and Vartia (1998), who provide evidence on the role of weak transparency in the Finnish banking crisis of the early 1990s.

[5] In this sense, ex ante transparency is based on the old notion that, if the price system works, it conveys at least some relevant information (see eg Hayek 1945 and Grossman and Stiglitz 1980).

tion is costly.[6] To achieve transparency, banks should regularly produce comprehensive information eg on their financial performance and solvency, risk-management policy, risk exposures in various dimensions, general business strategy, accounting policy, and corporate governance systems (see eg Basel Committee 1998a).[7] At the very least, such disclosure requires a well-functioning information and bookkeeping system, labor inputs from the accounting, risk management and IT departments, and binds the scarce resources of banks.

- *Indirect compliance costs* may arise from the information intensity of lending decisions and from the weak protection of *informational* property. As known at least since the influential article by Arrow (1962), it is hard to appropriate the rents on investments in information production, because property rights governing information are weak. Transparency regulation almost by definition worsens these appropriability problems.[8] In a recent article Anand and Galetovic (1999) point out that the information that financial intermediaries produce can be treated as either a private good or a public good. Should the monitoring information be private, greater transparency could diminish the banks' monopoly power over certain customers or customer groups. Should the monitoring information be a public good, greater transparency could enhance the incentive to free-ride on other banks' monitoring efforts. In sum, an inherent property of transparency regulation is that it escalates the leakage of banks' proprietary information and hence may reduce their profitability.[9]

We feel that these effects of the financial safety net and the costs of transparency, even though seemingly almost self-evident, have been overlooked in the campaign for high-quality public disclosure in banking. When complying with trans-

---

[6] The Basel Committee (1998a) acknowledges that incremental costs for banks due to transparency requirements can be substantial. Mayes (1997) documents the fear of increased disclosure costs for banks in New Zealand and the measures taken by the Reserve Bank to reduce them, in the context of the regulatory reform of 1996. Moreover, in studying the financial stability-related need for financial market data, Davis et al (1999, p. 107) argue while there seems to be 'an almost infinite demand for data' and a 'growing demand for increasingly complex data', 'there are limits to what data suppliers, particularly banks, on whom a significant burden falls in many countries, are willing to supply.' (see also footnote 4). Such reluctance by the banks to meet the growing data and transparency needs reflects, if anything, the costs involved.

[7] Disclosure alone may not suffice for bank transparency. There are for instance problems related to proper measurement and communication of banking risks. Mayes and Vesala (1998, p. 22) report that banks in New Zealand encountered difficulties in convincing the market of the quality of their risk management after a new market-based system of banking supervision with stringent disclosure requirements was implemented in 1996.

[8] This point has been stressed by Rosengren (1998). He argues that transparency is to some extent inconsistent with the very nature of bank lending, because loan transactions are based on confidential relationships and because banks have private information on customers' investment projects. See also Jordan et al (2000, p. 307).

[9] Other indirect compliance costs might arise because the banking industry is heavily regulated. Although a regulatory policy, considered in isolation, might not entail compliance costs, it could create a burden to banks if the particular regulation were part of a comprehensive safety net. Such regulatory compliance costs would thus be endogenous to the design of the financial safety net, and any attempt to use regulatory policy to obtain a second-best solution would generate a third-best outcome at most. In appendix 2 we consider one source of such indirect 'regulatory compliance costs', viz those costs that are caused by the interaction of transparency requirements with the pricing of the DIS.

parency regulation is costly, a tradeoff emerges. On the one hand, a transparency requirement enhances market discipline and reduces the moral hazard temptation. On the other hand, transparency requirements constitute an economic burden to banks, which increases their private incentive to take risks. We show that if the coverage of the DIS is broad, so as to dilute the beneficial effect of transparency regulation on market discipline, the regulation eventually destabilizes the banking system.

Another key insight in this article is that the impact of transparency regulation on banks' charter values deserves careful attention. A bank's charter or franchise value consists of its expected future profits. It is well understood that expected future profits can discipline banks by increasing the private cost of risk-taking (see eg Herring and Vankudre 1987, Keeley 1990, Suarez 1994, Acharya 1996, Demsetz, Saidenberg and Strahan 1996, and Bhattacharya et al 1998). Following the reasoning for capital requirements in Hellmann, Murdock and Stiglitz (2000), it is tempting to conclude that the costs of transparency requirements undermine the charter value and thereby worsen the moral hazard problem. However, it turns out that the effect of transparency regulation on charter value depends crucially on the nature of the regulation. The intuitive negative effect prevails if the compliance costs are direct or monitoring information is a private good. If monitoring information is a public good, transparency requirements may boost the charter value, because for a given monitoring effort, a bank can by free-riding increase its success probability. This creates an unforeseen rationale for transparency regulation.

Finally, we propose a new welfare-related justification for transparency regulation. In our model depositors' self-fulfilling expectations lead to multiple equilibria when banks' risk profiles are unobservable. The transparency requirement works like the deposit insurance in Matutes and Vives (1996) in removing the 'bad' equilibrium, ie the collapse of the banking sector.

Perhaps the articles most closely related to our study are Shy and Stenbacka (1999), Matutes and Vives (2000), and especially Cordella and Levy Yeyati (1998a, b). Shy and Stenbacka (1999) and Matutes and Vives (2000) analyze the impact of market power on banks' risk-taking incentives. In both models, banks compete on the basis of observable asset quality, and the introduction of flat premium deposit insurance eliminates the beneficial effects of the competition. Matutes and Vives (2000) also show that unobservable portfolio risk, along with limited liability, leads to maximal risk taking incentives. Cordella and Levy Yeyati (1998a, b) compare unobservable and observable asset portfolio risks. Cordella and Levy Yeyati (1998a) point out that if the shocks are economy-wide and banks cannot control their asset portfolio risks, then full transparency of banks' risk positions may destabilize the banking system. Cordella and Levy Yeyati (1998b) analyze the pricing of a DIS and the observability of portfolio risk. They establish an interesting equivalence result: full transparency and a risk-based DIS lead to an equal risk-taking incentive.

Our analysis is also related to the literature dealing with the moral hazard problem caused by a DIS. The proposed remedies include risk-based insurance premiums, capital adequacy requirements, incentive-compatible DISs, banks' equity investments, and intertemporal asset diversification (see eg Chan, Greenbaum and Thakor 1992, Craine 1995, Kupiec and O'Brien 1998, Santos 1999, and Niinimäki 2000). We complement these efforts by studying how the transparency requirement and banks' charter values mitigate the moral hazard problem.

The rest of the article proceeds as follows. In section 2, we set out a model of horizontal differentiation where banks compete for depositors on the basis of

asset quality. To keep our analysis as simple and comparable with the previous literature as possible, we adopt the standard model of spatial competition developed by Salop (1979). This model - and its cousin, the Hotelling line - has been used extensively in the banking literature, eg in Williamson (1987), Besanko and Thakor (1992), Chiappori, Perez-Castrillo and Verdier (1995), Matutes and Vives (1996), and Villas-Boas and Schmidt-Mohr (1999). In particular, the setup in Cordella and Levy Yeyati (1998b) is quite similar to ours. In section 3 we evaluate the various costs of transparency regulation and prove our main proposition that transparency regulation may increase financial fragility. In section 4, we provide a rationale for the transparency requirement and DIS. Concluding remarks are given in section 5. We also perform a series of robustness checks in appendices 2-4, where we elaborate on our assumptions regarding interest rate competition, pricing of deposit insurance and the possibility of voluntary disclosure.

2 The Basic Model

Consider a universally risk-neutral economy with a horizontally differentiated banking industry where there are n banks, indexed by $i = 1, \ldots, n$. As usual, the banks are assumed to locate themselves symmetrically on a unit circle.[10] There is a continuum of potential depositors uniformly distributed along the circle. Following the earlier literature, eg Williamson (1987), Besanko and Thakor (1992), Chiappori et al (1995) and Matutes and Vives (1996), all depositors incur a 'transportation cost' when traveling to a bank. The cost per unit of distance is τ. This cost need not to be interpreted geographically, as it includes all market participation costs and frictions of depositing that are valued or incurred in different ways by each depositor. The depositor's 'distance' from a particular bank is denoted by x.

The financial safety net in our model consists of a deposit insurance scheme (DIS). The same reasoning applies to the other parts of the safety net in so far these impair market discipline.[11] The size of deposits is denoted by $d < 1$. We normalize to unity the banks' repayment obligation, ie the debt that banks owe to depositors.[12] As a result, the interest factor (interest rate plus one) can be written as d^{-1}. The DIS is such that the depositors receive a fraction σ of the promised repayment if a bank defaults. We assume that the parameter σ reflects the de facto coverage of the DIS.[13]

The banks invest the collected funds in risky projects (loans). The probability that a unit of deposit funds invested in bank i's portfolio will yield a positive return is denoted p_i. The net return or profit margin over the deposit unit is denoted by m, and the probability of a zero return is $1-p_i$. If a bank's projects fail, the bank itself also fails. We assume that the only cost of a bank failure is that the depositors of the failing bank suffer the loss of their funds to the extent that they are not insured.

Clearly, the probability of bank failures is affected by banks' lending and monitoring decisions. The success probability reflects the bank's screening and monitoring decisions and ultimately its ability to gather information for building a high quality loan portfolio We thus assume that p_i is a strictly increasing and concave function of a bank's monitoring effort, e_i, ie $p_i \equiv p(e_i)$ with $p_e > 0$ and $p_{ee} <$

---

[10] As eg Stole (1995) notes, this assumption of equidistant intervals between banks is in accordance with the principle of maximal differentiation. We take the number of the banks, n, as given. Ignoring banks' entry and location decisions allows us to focus on the determination of the bank failure rate.

[11] Note that some parts of the safety net, such as the lender-of-last-resort arrangement, increase banks' charter values, which complicates the evaluation in a dynamic setting. Nonetheless, for a sufficiently high discount rate, the effect a lender of last resort is similar to the DIS (calculations proving this point are available from the authors upon request).

[12] To present our main argument as clearly as possible, we initially make quite a few assumptions that are admittedly relatively strong. For the most of the article, the interest rate is taken as given and no deposit insurance premium is charged to the banks. We show that these assumptions can be made without loss of generality in appendices 2 and 3. Moreover, up to section 4 we do not explicitly model the rationale for the DIS.

[13] There is a significant variation in the extent of the DIS across countries. In many countries, notably in the US, the de facto safety net has as a rule been extended prior to the explicit guarantee entailed in the DIS. If the de jure boundaries of the safety net are known to be flexible in practice, eg if uninsured depositors also are protected when failing banks are resolved, the behavior of these claimants on banks is affected accordingly (Jagtiani, Kaufman and Lemieux 1999).

0.[14] In the spirit of modern banking theory, increasing p_i is costly because of information gathering costs, ie because of the ex ante interim and ex post monitoring costs that necessarily burden banks if they want to improve their lending quality. The costs might also reflect investments in risk management techniques, such as information systems, databases and credit scoring models. Except when evaluating the direct costs of transparency, we can simply let bank *i*'s cost function be e_i without loss of generality. Moreover, p_i is concave, reflecting diminishing returns on monitoring effort.

The crucial ingredient of the model is that the success probability p_i is only imperfectly observable. We assume in particular that only a fraction, α, of the depositors is informed. The rest of the depositors evaluate bank *i*'s asset risk positions according to the expectation $E(p_i) = p_i^e$. In equilibrium, these beliefs are fulfilled, as the uninformed depositors infer that the banks' failure probabilities are those that prevail in the Nash equilibrium. The model thus captures a rudiment of the rational expectations folklore (Matutes and Vives 1996, 2000).

The portion of informed depositors depends on banks' information disclosure policy. Such information disclosure is however costly. These costs are spelled out in the subsequent section. We initially assume that the banks voluntarily provide no information, and prove in appendix 4 that under plausible conditions the assumption is not restrictive. The parameter α can thus be identified as *a transparency requirement* imposed by the regulatory authority. Our principal interest is to investigate how the transparency requirement affects the probability of bank failures.

The timing of events is as follows. First, the depositors form a common assessment of the success probability of each bank. Second, the banks choose their success probabilities, which are observed only by the informed depositors. Finally, the depositors choose their banks. An alternative description of the timing is that the uninformed and informed depositors are assumed to deposit in the banks in the first and the third stage, respectively.

A bank competes for depositors via its repayment probability, *p*. Following the usual practice we take the number of banks, *n*, as given, and focus entirely on symmetric equilibria. Let us now focus on the behavior of an informed depositor located at distance $x \in [0, n^{-1}]$ from bank *i*. The bank is able to attract a depositor only if the expected return on the deposit is nonnegative and the repayment contract is more lucrative than those offered by rival banks. The participation constraint of the informed depositor is

$$p_i + (1 - p_i)\sigma - d \geq \tau x \tag{1}$$

and bank *i*'s repayment contract is more attractive than its rivals if

$$p_i + (1 - p_i)\sigma - d - \tau x \geq \bar{p} + (1 - \bar{p})\sigma - d - \tau(n^{-1} - x) \tag{2}$$

where $\bar{p} = p_j$ for $j \neq i$. Combining (1) and (2) shows that the informed depositor chooses bank *i* if

[14] We denote the partial derivatives by subscripts when there is no risk of confusion.

$$x \le \min\left[\frac{p_i + (1-p_i)\sigma - d}{\tau}, \frac{1}{2n} + \frac{(p_i - \bar{p})(1-\sigma)}{2\tau}\right] \tag{3}$$

The condition for an uninformed depositor is perfectly analogous and is not derived explicitly.

In the terminology of Villas-Boas and Schmidt-Mohr (1999), we focus on *full-scale competition*, ie we assume that τ is small enough to guarantee that the market will be covered in equilibrium.[15] Under full-scale competition, the total supply of funds for bank *i* is

$$D_i = \frac{1}{n} + (1-\sigma)\left[\frac{\alpha(p_i - \bar{p}) + (1-\alpha)(p_i^e - \bar{p}^e)}{\tau}\right] \tag{4}$$

Bank *i*'s profits in a period can now be written as

$$\pi_i = p_i m D_i - e_i \tag{5}$$

To keep the per-period profits constant, we assume that a failed bank is replaced by a new bank. Evaluating the value functions at the end of each period, bank *i*'s charter value, V_i, solves $V_i = \delta(\pi_i + p_i V_i)$ where δ is the common discount factor. Bank *i*'s charter value is thus given by

$$V_i = \frac{\delta \pi_i}{1 - \delta p_i} \tag{6}$$

Bank *i* chooses e_i so as to maximize the charter value in (6). The first-order condition is

$$\frac{\partial \pi_i}{\partial e_i} + \frac{\delta \pi_i}{1 - \delta p_i}\frac{\partial p_i}{\partial e_i} = 0 \tag{7}$$

Equation (7) already provides the essential insights to the interaction of a bank's charter value with regulatory interventions. The second term in (7) shows how the threat of a bankruptcy clearly renders the bank prudential. Because of the limited liability, the bankruptcy costs are essentially the opportunity costs of lost future profits. The higher the charter value, the higher the bank's private cost of asset portfolio risk. All regulatory interventions that reduce future profits also reduce banks' incentive to avoid bankruptcy.

By using equations (4)-(5), symmetry, and rational prior beliefs, $p_i = p_i^e = \bar{p} = \bar{p}^e \equiv p$, equation (7) can be simplified to

---

[15] An implication of this assumption is that we leave aside the local monopoly and touching markets cases. For a characterization of such market structures and the associated equilibria, see eg Salop (1979), Matutes and Vives (1996), Villas-Boas and Schmidt-Mohr (1999). A further restriction on the scope of the present analysis is that we focus on local interactions between banks, ie on *local competition,* so that the potential market share of a bank consists of depositors located between the bank and its immediate neighbors (see Stole 1995).

$$p_e\left[\frac{p\alpha m(1-\sigma)}{\tau}+\frac{1}{1-\delta p}\left(\frac{m}{n}-\delta e\right)\right]=1 \tag{8}$$

Assuming that p_i is sufficiently concave to ensure that the second-order conditions for a maximum are satisfied, equation (8) implicitly determines the equilibrium success probability in the banking industry as a function of α, δ, σ, τ, m and n. Their impact on financial fragility in this basic model can be summarized as follows.

Remark 1. The probability of bank failures is directly related (i) the discount rate ($de/d\delta \geq 0$), (ii) the coverage of the DIS ($de/d\sigma \leq 0$), (iii) the participation costs ($de/d\tau \leq 0$), and (iv) the number of banks ($de/dn \leq 0$) and inversely related to (v) the profit margin, m, ($de/dm \geq 0$) and (vi) the level of transparency ($de/d\alpha \geq 0$).

Proof: As the proof for (i) is slightly trickier than the straightforward proofs for (ii)-(vi), we explicitly prove only part (i). The condition that banks' equilibrium charter values are strictly positive is given by $V(e)>0$, where e solves (8). By using (4)-(6), condition $V(e)>0$ turns out to be equivalent to $pm-ne>0$. Finally, totally differentiating (8) with respect to e and δ shows that the sign of $de/d\delta$ is given by the sign of $pm-ne$.

QED

These findings are as expected and for the most part well-known from previous work: as profitability deteriorates, its disciplinary role diminishes. Especially part (iv), the impact of market power on the probability of bank failures, has intensively been studied recently. For instance, Cordella and Levy Yeyati (1998b) and Matutes and Vives (2000) obtain a result similar to ours, and Shy and Stenbacka (1999) provide a counter argument.

The main concern in this article is to isolate the effect of the transparency requirement, α. The common view is that increasing the level of transparency increases banks' incentives to reduce their risk-taking. In short, it is widely thought that $de/d\alpha > 0$, and part (vi) in remark 1 uncovers the static disciplinary mechanism underlying this common view. However, as discussed in the introduction, this argumentation has two prominent defects. The contracting force of the financial safety net can already be observed from (8). If $\sigma = 1$, the transparency requirement is irrelevant. Another and perhaps the more important defect of the argumentation is that it ignores direct and indirect compliance costs of transparency. Proper evaluation of the transparency argument necessitates incorporation of these costs into the model.

Before proceeding, we verify the initial assumption that full-scale competition prevails if the participation costs are sufficiently small. The sufficient condition for full-scale competition can be written as

$$\sigma + p(1-\sigma) - d - \frac{\tau}{2n} \geq 0 \tag{9}$$

By remark 1, p is decreasing in τ. Consequently, the inequality (9) holds if τ is sufficiently small.

3 The Effect of Transparency Regulation on Financial Fragility

In this section we introduce the direct and indirect compliance costs of transparency in order to investigate their potential of undermining the static disciplinary effect or the dynamic effect stemming from banks' charter values. We illustrate three sources of such compliance costs. In the first scenario, direct compliance costs stemming from disclosure are considered. In the second and third scenarios, compliance costs are indirect, because they are caused by leakage of information gathered by a bank to its rivals. The second scenario is based on the assumption that monitoring information is primarily a private good; in the third scenario this information is treated as a public good. Although these three scenarios are presented separately in order to specify the basic mechanisms that we wish to emphasize, they can be combined in a straightforward manner.

3.1 The Effect of Direct Transparency Costs

In this scenario we focus on the direct transparency costs that banks incur in complying with transparency requirements. It is assumed that these costs directly enter the bank's cost function.

Assumption 1. Bank *i*'s cost function is given by $c_i = e_i + \alpha + s\alpha e_i$.

In this formulation of the cost function, the parameter *s* (scope) captures the sign of the cross-partial derivative $\partial^2 c_i/\partial e_i \partial \alpha$. Depending on whether *s* is positive or negative, there are diseconomies or economies of scope in monitoring and achieving transparency. Except for the introduction of α into the cost-function, the analysis of the basic model in section 2 remains unchanged. Using c_i from assumption 1 in the basic model and proceeding as in (1)-(8) one obtains the first-order condition

$$p_e\left[\frac{p\alpha m(1-\sigma)}{\tau}+\frac{1}{1-\delta p}\left(\frac{m}{n}-\delta c\right)\right]-s\alpha=1 \tag{10}$$

By inspecting (10) we can prove the following claim.

PROPOSITION 1. If economies of scope in monitoring and achieving transparency are at most moderate and the coverage of the DIS is sufficiently broad, an increase in the transparency requirement increases the probability of bank failures. Otherwise, the reverse obtains.

Proof: Differentiating (10) with respect to *e* and α shows that the sign of $de/d\alpha$ is given by the sign of

$$\frac{p_e pm(1-\sigma)}{\tau}-\frac{p_e\delta(1+es)}{1-\delta p}-s \tag{11}$$

From (11) we obtain a necessary condition on s for $de/d\alpha < 0$. If $s \leq \tilde{s}$, where $\tilde{s}$ is implicitly determined by

$$\tilde{s} = -\frac{p_e \delta}{1 - \delta p + p_e e \delta} \tag{12}$$

it holds for all σ that $de/d\alpha \geq 0$. Similarly, a sufficient condition in σ for $de/d\alpha < 0$ can be obtained from (11). If $\sigma > \tilde{\sigma}$, where $\tilde{\sigma}$ is implicitly determined by

$$\tilde{\sigma} = \max\left\{1 - \frac{\tau}{pm}\left[\frac{s}{p_e} + \frac{\delta(1+es)}{1-\delta p}\right], 0\right\} \tag{13}$$

then $de/d\alpha < 0$. In appendix 1 we prove the uniqueness of the threshold levels of s and σ as implicitly defined by (12) and (13).

QED

We can now articulate the tradeoff underlying this finding. The first term in (11) captures the disciplinary effect from the increased transparency consisting of the response in the supply of funds to changes in bank risk. The disciplinary effect that reduces the incentive to risk-taking is the stronger, the larger the share of uninsured deposits. This benefit of the enhanced market discipline should be weighed against the reduction in the bank's charter value caused by the costs of transparency regulation. The second and the third term in (11) capture these costs. If the supply response of funds is weak and economies of scope in monitoring and achieving transparency are at most moderate, the charter value effect dominates the disciplinary effect.

Our main point is thus embodied in proposition 1: there are plausible circumstances in which a transparency requirement increases financial fragility. Note that the threshold level of s in (12) is negative. This means that transparency regulation is certain to stabilize the banking sector only if there are significant economies of scope. Conversely, if there are significant diseconomies of scope, transparency regulation is certain to destabilize the banking sector. The following example illustrates how *dis*economies of scope emerge from banks' balance sheets, even with a separable cost function.

Example 1. Let $s = 0$ in the cost function specified by assumption 1, ie bank i's cost function is $c_i = \alpha + e_i$. Moreover, assume that the bank's balance sheet holds, ie that $A_i + \alpha + e_i = D_i d$, where A_i denotes bank i's asset portfolio investments. We now show that although the 'scope' parameter s is set to 0 at the outset, the balance sheet constraint ultimately generates diseconomies of scope. When the balance sheet constraint is imposed, bank i's deposits have to cover all its investment expenses so that bank i can invest only amount A_i. The one-period profits of bank i from (5) can in this case be rewritten as $\pi_i = p_i(yA_i - D_i) - \alpha - e_i$, where $y \equiv (m+1)d^{-1}$ captures the gross return on the investment portfolio for a unit of funds invested. Using the balance sheet constraint yields $\pi_i = p_i m D_i - (\alpha + e_i)(1 + p_i y)$, so that bank i's effective cost function can be written as $C_i = (\alpha + e_i)(1 + p_i y)$. It is clear that $\partial^2 C_i / \partial e_i \partial \alpha = y \partial p / \partial e_i > 0$.

It is however plausible to assert that recent advances in information technology have diminished other sources of diseconomies of scope besides the balance sheet constraint and have enlarged the welfare-improving potential of transparency regulation. To sketch an argument to this direction, we consider another specific example of the model.

Example 2. Let $\delta = 0$ and $p(e_i) = (2\gamma e_i)^{1/2}$ where parameter γ captures the efficiency of banks' monitoring technology. By using the specification of example 2, it turns out that if

$$\sigma > \max\left\{1 - \frac{\tau s}{\gamma m}, 0\right\}, \tag{14}$$

it always holds that $de/d\alpha < 0$. Equation (14) renders straightforward policy advice. The more efficient the bank's monitoring technology, the more likely that transparency regulation will be effective. Moreover, one could argue that innovations that increase the efficiency of monitoring technology also reduce the transportation costs and diseconomies of scope.

3.2 The Effect of Indirect Transparency Costs

The indirect costs of transparency arise from the information intensity of monitoring investments in the banking industry and the weak protection of informational property. We first focus on the possibility that transparency worsens the appropriability problems related to the profitable use of banks' monitoring information. We then consider the case in which transparency increases bank's opportunities to free ride on monitoring information produced by rival banks. In what follows, we suppress the direct transparency costs and return to the simple cost function of the basic model. In other words, we assume that bank i's costs are simply e_i.

3.2.1 Monitoring Information as a Private Good

To highlight our argument, we assume that information is initially perfectly excludable and that transparency regulation renders it partially non-excludable. We postulate that the transparency requirement has an impact on the profit margin via the following reduced form:

Assumption 2. Bank i's profit margin is $m_i = m + \alpha\left(\frac{\sum_{j\neq i=1}^{n} p_j}{n-1} - p_i\right)$.

The property $dm_i/dp_i = -\alpha$ of the profit margin indicates how the transparency requirement leads to an information leakage from bank i and reduces the bank's revenues generated eg by its private information on its customers' investment projects. As the level of transparency increases, the amount of information spilling across rival banks increases. However, the transparency requirement also increases bank i's opportunities to use information gathered by its rivals, ie $dm_i/dp_j = \alpha(n-1)^{-1}$. Because of the private good assumption, the value of information ob-

tained from another bank is the smaller, the greater the number of banks in the market. In other words, transparency regulation treats banks symmetrically and the information is evenly dispersed among the banks. The private good aspect is also reflected in another property of the profit margin. When bank *i* gathers information more intensively than its rivals on average, $dm_i/d\alpha < 0$.

Employing assumption 2 in (1)-(8) sharpens our predictions considerably. Substituting m_i from assumption 2 for m in the basic model and then proceeding as in (1)-(8) results in the first-order condition

$$p_e\left\{\alpha p\left[\frac{m(1-\sigma)}{\tau}-\frac{1}{n}\right]+\frac{1}{1-\delta p}\left(\frac{m}{n}-\delta e\right)\right\}=1 \qquad (15)$$

Equation (15) yields a unique threshold coverage of the DIS, which determines the sign of $dp/d\alpha$.

PROPOSITION 2. If the coverage of the DIS is broad, an increase in the transparency requirement increases the probability of bank failures. Otherwise, the reverse obtains.

Proof: Differentiating (15) with respect to e and α shows that $\frac{de}{d\alpha}<0$ if and only if $\sigma > \max\left\{1-\frac{\tau}{nm}, 0\right\}$.

QED

The explanations for propositions 1 and 2 are similar. There are costs and benefits associated with transparency regulation. The benefits are the same, viz the static disciplinary effect caused by the supply-of-funds response, but the cost sides differ. Although there are neither direct compliance costs nor an effect on the equilibrium charter value, the information disclosure is costly because it weakens the appropriability of the proprietary monitoring information. This can be seen from equation (15) where the term $-p\alpha n^{-1}$ captures the static profit-reducing impact of the information leakage. Proposition 2 also shows how the success of transparency regulation in stabilizing the banking market depends crucially on its structure. Because of the private-good assumption, the costs of transparency regulation are inversely related to the number of banks in the market. When there is little competition in the banking market, the prospects of a welfare-improving transparency regulation are restricted.

In order to obtain the clear-cut prediction of proposition 2, we had to make a number of simplifying assumptions. Whether the information leakage affects only the profit margin and leaves the success probability unchanged is a moot question. It would perhaps be more orthodox to consider the source and destination of the information spillovers to be the same activity. In other words, if the externality is created by the transparency of a bank's monitoring decisions, it should affect mainly the other bank's monitoring.

To evaluate the robustness of proposition 2 with respect to the activity where the spillover occurs and to provide a link to the subsequent section where information is regarded as a public good, we briefly consider an alternative model of information as a private good.

Assumption 3. Bank *i*'s success probability is given by $p_i \equiv p(E_i)$ where $E_i = e_i + \alpha\left(\frac{\sum_{j\neq i=1}^{n} e_j}{n-1} - e_i\right)$ denotes the effective monitoring investment.

Assumption 3 is identical to assumption 2 except that now both the source and destination of the spillover is the monitoring effort. Although the use of assumption 3 instead of assumption 2 complicates the equations slightly, an analysis similar to that presented in (1)-(8) yields the following familiar-looking first-order condition

$$p_E\left[\frac{\alpha pm(1-\sigma)}{\tau}\left(1-\frac{\alpha n}{n-1}\right)+\frac{1-\alpha}{1-\delta p}\left(\frac{m}{n}-\delta e\right)\right]=1 \tag{16}$$

By evaluating (16) we can prove the following claim.

PROPOSITION 3. At relatively high levels of transparency, an increase in the transparency requirement always increases the probability of a bank failure. At relatively low levels of transparency, an increase in the transparency requirement increases the probability of a bank failure when the coverage of the DIS is sufficiently broad.

Proof: Noting that in equilibrium, $E = e$ and differentiating (16) with respect to e and α reveals that the sign of $dp/d\alpha$ is given by the sign of

$$\frac{pm(1-\sigma)}{\tau}\left(1-\frac{2\alpha n}{n-1}\right)-\frac{1}{1-\delta p}\left(\frac{m}{n}-\delta e\right) \tag{17}$$

As shown in the proof of remark 1, if banks' equilibrium charter values are strictly positive, then $pm > en$. The second term in (17) is thus always negative, leading to two implications. First, a sufficient condition for $dp/d\alpha < 0$ is that $\alpha \geq (n\text{-}1)(2n)^{-1}$ and, second, even if $\alpha < (n\text{-}1)(2n)^{-1}$, $dp/d\alpha < 0$ when σ is sufficiently large (because the first term in (17) decreases as σ increases and approaches zero as σ approaches unity).

QED

Although the basic result remains unchanged, proposition 3 is less sharp than proposition 2. The term $1\text{-}2\alpha n(n\text{-}1)^{-1}$ in (17) depicts a spillover effect similar to the term $-pp_e\alpha n^{-1}$ in (15), but now the effect is ambiguous. When information leakage affects success probability, it simultaneously creates an opportunity for free-riding and reduces the bank's marginal productivity (in terms of success probability) of monitoring investment. At high levels of transparency, free-riding is advantageous and the marginal productivity of monitoring investment is low. Extensive transparency requirements therefore increase the vulnerability of the banking sector. There may however be room for limited transparency requirements if the banking industry is competitive and the supply response of funds sufficiently strong.

Another difference between the consequences of assumptions 2 and 3 is that the charter-value effect is again operative, as under assumption 1. This effect can be

seen from the second term in (17). Because information is a private good, the marginal productivity of monitoring investments diminishes as the level of transparency requirement rises. Consequently, for a given level of monitoring effort, banks' charter values are reduced. As we show in the following subsection, however, this finding hinges on the private-good assumption on monitoring information.

3.2.2 Monitoring Information as a Public Good

There are reasons to believe that in banking industry information may be a private good (see eg Anand and Galetovic 1999) even though information is usually considered a public good. In this section we elaborate on this view of information. As in the previous subsection, we assume that initially property rights governing information are perfect but that transparency regulation weakens them.

Assumption 4. Bank *i*'s success probability is given by $p_i \equiv p(E_i)$ where $E_i = e_i + \alpha \sum_{j \neq i=1}^{n} e_j$ denotes the effective monitoring investment.

Assumption 4 is a straightforward way of formalizing our view that the transparency requirement could generate pure information spillovers between banks. A similar spillover process is widely recognized in the economics of R&D. In particular, the spillover process initiated by Ruff (1969) and independently rediscovered by Spence (1984) comes close to our approach.

As in assumption 3, transparency requirements under assumption 4 increase banks' opportunities to use monitoring information produced by rival banks in their own monitoring. A concrete example might be the 'leakage' of creditworthiness information that is specific to a customer group or industry. The main distinction between assumptions 3 and 4 is that now the information is a pure public good. The marginal productivity of monitoring investment is unaffected by transparency regulation, and the only cost of regulation is the free-riding incentive that it generates. An implication of this distinction is that the equilibrium level of a bank's effective monitoring investment, E, is now $e(1+\alpha(n-1))$ and consists hence of the banks' own monitoring effort and the spillover multiplier.

Employing the success probability from assumption 4, the analysis proceeds as before. When the nature of information created by transparency regulation is changed from private to public good, the role of the bank's charter value also changes. In contrast to the previous analysis, transparency regulation may boost the charter value, because it increases the success probability for a given monitoring effort. This has a drastic effects on banks' incentives to gather information and on financial fragility. To see this, substitute $p(E_i)$ from assumption 4 for $p(e_i)$ in (1)-(8). In a symmetric equilibrium, this gives the first-order condition

$$p_E\left[\frac{pm(1-\sigma)\alpha(1-\alpha)}{\tau} + \frac{1}{1-\delta p}\left(\frac{m}{n} - \delta e\right)\right] = 1 \qquad (18)$$

With the help of (18), we prove the following proposition.

PROPOSITION 4. At relatively high levels of transparency, an increase in the transparency requirement may increase the probability of bank failure. At relatively low levels of transparency, an increase in the transparency requirement always reduces the probability of bank failure.

Proof: Define the left-hand side of (18) as a function of e and α and denote it by $f(e, \alpha)$ and its derivatives by $f_\alpha \equiv \partial f/\partial \alpha$, $f_e \equiv \partial f/\partial e$. Then the sign of $dE/d\alpha$ is given by the sign of

$$\frac{dE}{d\alpha} = -\frac{f_\alpha}{f_e}\left[1+\alpha(n-1)\right]+e(n-1) \tag{19}$$

Because $p(e_i)$ has to be sufficiently concave to keep our model well-behaved, f_e is negative. The sign of (19) is thus the same as the sign of

$$f_\alpha\left[1+\alpha(n-1)\right]-f_e e(n-1) \tag{20}$$

By calculating f_α and f_e from (18), substituting them for (20) and simplifying the resulting expression, we see that the sign of $dE/d\alpha$ is given by the sign of

$$\frac{pm(1-\sigma)}{\tau}(1-2\alpha)\left[1+\alpha(n-1)\right]+\frac{\delta e(n-1)}{1-\delta p} \tag{21}$$

The second term in (21) is always positive and increasing in δ, which leads to two implications: first, a sufficient condition for $de/d\alpha \geq 0$ is $\alpha \leq 1/2$ and, second, when $\alpha > 1/2$, $de/d\alpha < 0$ when δ is sufficiently small. This follows because the first term in (21) remains positive and the second term approaches zero as δ approaches zero.

QED

Proposition 3 seemingly contradicts the findings of the previous propositions. Nonetheless, the reasoning underlying this finding is familiar. As before, there is a spillover effect and a charter value effect whose roles remain unaltered. The charter value has, as before, a disciplinary role in mitigating moral hazard behavior. The difference lies at the roots of the moral hazard problem. Now transparency regulation creates a new moral hazard problem. Since the information generated by transparency regulation is a public good, there is a strong free-ride incentive. It is this moral hazard behavior that is partially eliminated by the charter value. For a given level of a bank's monitoring effort, transparency requirements enhance its charter value, which in turn enhances the incentive to monitor. If however market discipline is strong, large information spillovers tend to reduce the success probability. Note that an extensive DIS eliminates not only the advantageous static effect of transparency regulation but also the disadvantageous effect of large information spillovers.

4 A Rationale for Transparency

In this section we provide a welfare rationale for deposit insurance and transparency regulation. In addition to laying these foundations for our main assumptions, we continue to assess the robustness of our model in appendices 2 - 4.

It is often argued that deposit insurance is needed in order to avoid systemic crises arising from the inherent fragility of the banking industry. We now follow Matutes and Vives (1996, 2000) in providing such a rationale for deposit insurance. It also turns out that the same argument applies to the transparency requirement. Matutes and Vives (1996, 2000) show how the banking sector may be vulnerable to self-fulfilling crises if there is a minimum size requirement for banks. If a bank does not obtain the minimum market share, it cannot invest and fails with probability one. Investors' expectations then become self-fulfilling and the model therefore exhibits multiple equilibria, one of which is a collapse of the banking system. The introduction of deposit insurance prevents financial collapse by eliminating the 'no-banking' equilibrium.

In our model the minimum size requirement could emerge for instance from the economies of scale created by the balance sheet constraint considered in example 1. Because of costs caused by monitoring investments and the disclosure requirement imposed by the regulatory authorities, bank *i* needs a minimum market share to operate.

Let us now consider the role of deposit insurance and transparency in a model where a minimum market share is needed to make a bank operative. Suppose initially that no deposit insurance scheme is in place. Without deposit insurance, it is also true that depositors can lose their deposits if their banks fail. Suppose further that the degree of transparency in the market is low, so that the number of informed market participants is small. As a result, there is a coordination game on the uninformed depositors. If all the uninformed depositors expect that $p_i = 0$, ie that $p_i^e = 0$, then bank *i* has no uninformed customers for any p_i that it may choose. Because only informed depositors are responsive to the bank's actual choice of p_i and because the share of informed depositors is small, bank *i* cannot credibly choose a positive repayment probability, since it cannot cover its investment expenses. Consequently, even informed depositors will not deposit in bank *i*, which is then certain to fail. As *i* is arbitrary, the same reasoning applies to the entire industry.

In sum, the expectations of the uninformed depositors are realized in the equilibrium, and no one finds it profitable to unilaterally deviate from these strategies. We have thus proven the following claim.

PROPOSITION 5. With a sufficiently limited DIS (eg $\sigma \to 0$) and a sufficiently low degree of transparency (eg $\alpha \to 0$), a financial collapse with $D_i = 0$ and $p_i = p_i^e = 0$ ($i = 1,2, \ldots,n$) is possible.

Note that the no-banking equilibrium coexists with the interior symmetric equilibrium characterized by full-scale competition. It is however sufficient that either $\sigma \to 1$ or $\alpha \to 1$ in order to eliminate the no-banking equilibrium. As a result, there are possibilities for a welfare-improving transparency requirement and a DIS, even if these increase moral hazard in the banking industry.

5 Conclusions and Policy Implications

In this article we examine the validity of the frequently raised argument that a stringent transparency requirement enhances market discipline and hence the soundness of a banking sector in the presence of a DIS. We provide plausible conditions under which this argument is and is not valid. Besides evaluating the received justifications for transparency regulation, we propose two novel justifications. First, if the information created by transparency regulation is a public good, it enhances the banks' charter value, boosting the monitoring incentives for low levels of transparency. Second, even if bank transparency increases the probability of bank failure, it may prevent a complete collapse of the banking sector arising from the self-fulfillment of depositors' expectations.

Though there are several limitations to our simple model, we boldly offer some policy recommendations based on our analysis. Firstly, in the campaigns for the increased transparency, the associated costs - be they direct or indirect compliance costs - should be given proper attention. The direct compliance costs stem from the incremental investments in information and bookkeeping systems caused by the transparency regulation. They dilute the bank's charter value and thereby reduce the private costs of increasing risk profile. The indirect costs may materialize, because the protection of informational property is imperfect. Under extensive transparency requirements, it can be difficult to exclude banks from using their rivals' monitoring information. Such appropriability problems reduce banks' profit margins and lead to pervasive free-riding. If monitoring information is primarily a private good, the indirect costs of transparency have the same negative impact on the charter value as direct costs.

Secondly, the disclosure requirements could in principle be designed so as to minimize the costs to banks. The mandatory production of information should be useful for banks in managing their risks (see Mayes 1997 for a discussion in this spirit). As a result, significant economies of scope could arise in risk management and achieving transparency. In this case, neither direct compliance costs nor broad de facto coverage by the DIS would reduce the efficiency of stringent disclosure requirements. The mandatory disclosure should also deal with public-good-type information instead of the bank-specific proprietary information.

Finally, our findings support a partial DIS. Besides eroding market discipline, an extensive DIS destroys the *potential* of transparency for stabilizing the banking system. In line with this view, New Zealand's 1996 reform of banking supervision included tight disclosure requirements and an abolition of the DIS.

References

Acharya, S., 1996, Charter Value, Minimum Capital Requirement and Deposit Insurance Pricing in Equilibrium, *Journal of Banking and Finance* 20, pp. 351-375.

Ahmed, A. S., Takeda, C., and Thomas, S., 1999, Bank Loan Loss Provisions: A Reexamination of Bank Capital Management, Earnings Management and Signaling Effects, *Journal of Accounting and Economics* 28, pp. 1-25.

Anand, B. H, and Galetovic, A., 1999, Information, Non-Excludability, and Financial Market Structure. Forthcoming in *Journal of Business*.

Arrow, K. J., 1962, Economic Welfare and Allocation of Resources for Invention. In R. Nelson (ed) *The Rate of Inventive Activity: Economic and Social Factors*, Princeton University Press, Princeton, New Jersey.

Basel Committee, 1998a, Enhancing Bank Transparency: Public Disclosure and Supervisory Information That Promote Safety and Soundness in Banking Systems, September 1998.

Basel Committee, 1998b, Sound Practices for Loan Accounting, Credit Risk Disclosure and Related Matters, Consultative paper issued by The Basel Committee on Banking Supervision, October 1998.

Basel Committee, 1999, Best Practices for Credit Risk Disclosure, Consultative paper issued by The Basel Committee on Banking Supervision, July 1999.

Beatty, A., Chamberlain, S. and Magliolo, J., 1995, Managing Financial Reports of Commercial Banks: The Influence of Taxes, Regulatory Capital and Earnings, *Journal of Accounting Research* 33, pp. 231-262.

Berlin, M., Saunders, A., and Udell, G. F., 1991, Deposit Insurance Reform: What Are the Issues and What Needs to Be Fixed?, *Journal of Banking and Finance* 15, pp. 735-752.

Besanko, D., and Thakor, A. V., 1992, Banking Deregulation: Allocational Consequences of Relaxing Entry Barriers, *Journal of Banking and Finance* 16, pp. 909-932.

Bhattacharya, S., Boot, A. W. A., and Thakor, A.V., 1998, The Economics of Bank Regulation, *Journal of Money, Credit and Banking* 30, pp. 745-770.

Billet, M. T., Garfinkel, J. A., and O'Neal, E. S., 1998, The Cost of Market versus Regulatory Discipline in Banking, *Journal of Financial Economics* 48, pp. 333-358.

Calomiris, C. W. and Kahn, C. M., 1991, The Role of Demandable Debt in Structuring Optimal Banking Arrangements, *American Economic Review* 81, pp. 497-513.

Carletti, E., 1999, Bank Moral Hazard and Market Discipline, Paper presented at a Bank of Finland/CEPR Workshop on The Future of Financial Services Industry and New Challenges for Supervision.

Chan, Y-S., Greenbaum, L. S., and Thakor, A. V., 1992, Is Fairly Priced Deposit Insurance Possible?, *Journal of Finance* 47, pp. 227-246.

Chen, Y., 1999, Banking Panics: The Role of the First-Come, First-Served Rule and Information Externalities, *Journal of Political Economy* 107, pp. 946-968.

Chiappori, P-A., Perez-Castrillo, D., and Verdier, T., 1995, Spatial Competition in the Banking System: Localization, Cross-subsidies and the Regulation of Deposit Rates, *European Economic Review* 39, pp. 889-918.

Collins, J., Shackelford, D., and Wahlen, J., 1995, Bank Differences in Coordinating of Regulatory Capital, Earnings, and Taxes, *Journal of Accounting Research* 33 , pp. 263-292.

Cordella, T. and Levy Yeyati, E., 1998a, Public Disclosure and Bank Failures, Centre for Economic Policy Research, Discussion Paper, No. 1886.

Cordella, T. and Levy Yeyati, E., 1998b, Financial Opening, Deposit Insurance and Risk in a Model of Banking Competition. Centre for Economic Policy Research, Discussion Paper, No. 1939.

Craine, R., 1995, Fairly Priced Deposit Insurance and Bank Charter Policy, *Journal of Finance* 50, pp. 1735-1746.

Davis, P. E., Hamilton, R., Heath, R., Mackie, F., and Narai, A., 1999, Financial Market Data for Financial Stability, Centre for Central Bank Studies, Bank of England, June 1999.

Demirguc-Kunt, A., and Detragiache, E., 1998, The Determinants of Banking Crises in Developed and Developing Countries, International Monetary Fund, Staff Papers 45, pp. 81-109.

Demirguc-Kunt, A., and Huizinga, H., 1999, Market Discipline and Financial Safety Net Design, the World Bank, mimeo.

Demsetz, R. S., Saidenberg, M. R. and Strahan, P. E., 1996, Banks with Something to Lose: The Disciplinary Role of Franchise Value, Federal Reserve Bank of New York, *Economic Policy Review* (October, 1996), pp. 1-14.

Dewatripoint, M. and Tirole, J., 1994, *The Prudential Regulation of Banks*, The MIT Press, Cambridge, Massachusetts.

Edwards, F. R. and Mishkin, F. S., 1995, The Decline of Traditional Banking: Implications for Financial Stability and Regulatory Policy, National Bureau of Economic Research, Working Paper, No. 4993.

Enoch, C., Stella, P., and Khamis, M., 1997, Transparency and Ambiquity in Central Bank Safety Net Operations, International Monetary Fund, Working Paper, WP/97/138.

Garcia, G. G. H., 1999, Deposit Insurance: A survey of Actual and Best Practices, International Monetary Fund, Working Paper, WP/99/54.

Genay, H., 1998, Assessing the Condition of Japanese Banks: How Informative Are Accounting Earnings? Federal Reserve Bank of Chicago, *Economic Perspectives* 22, No. 4., QIV.

Goldberg, L. G., and Hudgins, S. C., 1999, Depositor Discipline and the Behaviour of Uninsured Deposits: FSLIC vs. SAIF, Paper presented at the 1999 Meeting of the European Finance Association, Helsinki.

Grossman, S. J., and Stiglitz, J. E., 1980, On the Impossibility of Informationally Efficient Markets, *American Economic Review* 70, pp. 393-408.

Hayek, F. H., 1945, The Use of Knowledge in Society, *American Economic Review* 35, pp. 519-530.

Heffernan, S. A., 2000, Competition in British Retail Banking, 1993-1999, City University Business School, Department of Banking & Finance Working Paper, No. 90.

Hellmann, T.F., Murdock, K. C., Stiglitz, J. E., 2000, Liberalization, Moral Hazard in Banking, and Prudential Regulation: Are Capital Requirements Enough? *American Economic Review* 90, pp. 147-165.

Herring, R. J. and Vankudre, P., 1987, Growth Opportunities and Risk-Taking by Financial Intermediaries, *Journal of Finance* 42, pp. 583-600.

Jagtiani, J., Kaufman, G., and Lemieux, C, 1999, Do Markets Discipline Banks and Bank Holding Companies? Evidence from Debt Pricing, Federal Reserve Bank of Chicago, Emerging Issues Series, S&R-99-3R, June 1999.

Jagtiani, J. and Lemieux, C, 2000, Stumbling Blocks to Increasing Market Discipline in the Banking Sector: A Note on Bond Pricing and Funding Strategy Prior to Failure. Emerging Issues Series, Supervision and Regulation Department, Federal Reserve Bank of Chicago, S&R-99-8R, April 2000.

Jordan, J. S., Peek, J., and Rosengren, E. S., 1999, The Impact of Greater Bank Disclosure Amidst a Banking Crisis, Federal Reserve Bank of Boston, Working Paper, No. 99-1.

Jordan, J. S., Peek, J., and Rosengren, E. S., 2000, The Market Reaction to the Disclosure of Supervisory Actions: Implications for Bank Transparency, *Journal of Financial Intermediation* 9, pp. 298-319.

Kaminsky, G. L. and Reinhart, C. M., 1999, The Twin Crises: The Causes of Banking and Balance-of-Payments Problems. *American Economic Review* 89, pp. 473-500.

Kane, E. J., 1989, *The S&L Insurance Mess: How Did it Happen?,* Washington D.C., Urban Institute Press.

Keeley, M., 1990, Deposit Insurance, Risk, and Market Power in Banking, *American Economic Review* 80, pp. 1183-1200.

Kiander, J. and Vartia, P., 1998, *Suuri Lama. Suomen 1990-luvun kriisi ja talouspoliittinen keskustelu.* Taloustieto Oy: Helsinki. (The title in English: 'The Great Depression. The Finnish Economic Crisis and Policy Discussion in 1990s'.)

Kupiec, P. H. and O'Brien, J. M, 1998, Deposit Insurance, Bank Incentives, and the Design of Regulatory Policy, Federal Reserve Bank of New York, *Economic Policy Review* (October, 1998), pp. 201-211.

Matutes, C. and Vives, X., 1996, Competition for Deposits, Fragility, and Insurance, *Journal of Financial Intermediation* 5, pp. 184-216.

Matutes, C. and Vives, X., 2000, Imperfect Competition, Risk Taking, and Regulation in Banking, *European Economic Review* 44, pp. 1-34.

Martinez Peria, M. S., and Schmukler S. L., Do Depositors Punish Banks for 'Bad' Behaviour?, Policy Research Paper, N.: 2058, World Bank.

Mayes, D., 1997, A Market Based Approach to Maintaining Systemic Stability: Experiences from New Zealand, Bank of Finland Discussion Papers, No. 18/97.

Mayes, D., 1998, Improving Banking Supervision, Bank of Finland Discussion Papers, No. 23/98.

Mayes, D., and Vesala, J., 1998, On the Problems of Home Country Control, Bank of Finland Discussion Papers, No. 20/98.

Morgan D. P., 1999, Whether and Why Banks Are Opaque, Paper presented at the 36th Annual Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago.

Niinimäki, J.-P., 2000, Intertemporal Diversification in Financial Intermediation. Forthcoming in *Journal of Banking and Finance*.

Park, S., 1995, Market Discipline by Depositors: Evidence from Reduced-form Equations, *Quarterly Review of Economics and Finance* 35, pp. 497-514.

Park, S., and Peristiani, S., 1998, Market Discipline by Thrift Depositors, *Journal of Money, Credit and Banking* 30, pp. 347-364.

Poon, W. P. H., Firth, M., and Fung, H-G., 1999, A Multivariate Analysis of the Determinants of Moody's Bank Financial Strength Ratings, *Journal of International Financial Markets, Institutions and Money* 9, pp. 267-283.

Ruff, L., 1969, Research and Technological Progress in a Cournot Economy, *Journal of Economic Theory* 1, pp. 397-415.

Rochet, J. C. and Tirole, J., 1996, Interbank Lending and Systemic Risk, *Journal of Money Credit, and Banking* 28, pp. 733-762.

Rosengren, E., 1998, Will Greater Disclosure and Transparency Prevent the Next Banking Crisis? Federal Reserve Bank of Boston, Working Paper, No. 98-8.

Salop, S., 1979, Monopolistic Competition with Outside Goods, *Bell Journal of Economic*s 8, pp. 378-393.

Santos, J., 1999, Bank Capital and Equity Investment Regulations, *Journal of Banking and Finance* 23, pp. 231-254.

Shy, O. and Stenbacka, R., 1999, Market Structure and Risk Taking in the Banking Industry. Unpublished manuscript, Swedish School of Economics.

Spence, M., 1984, Cost Reduction, Competition, and Industry Performance, *Econometrica* 52, pp. 101-121.

Stole, L., 1995, Nonlinear Pricing and Oligopoly, *Journal of Economics and Management Strategy* 4, pp. 529-562.

Suarez, J., 1994, Closure Rules, Market Power and Risk-Taking in a Dynamic Model of Bank Behaviour, LSE Financial Markets Group / An ESCR Research Centre, Discussion Paper, No. 196.

Summers, L. H., 2000, International Financial Crises: Causes, Prevention and Cures. *American Economic Review* 90, *Papers and Proceedings*, pp. 1-16.

United States General Accounting Office, 1994, Depository Institutions: Divergent Loan Loss Methods Undermine Usefulness of Financial Reports, GAO/AIMD-95-8.

Villas-Boas J. M., and Schmidt-Mohr, U. 1999, Oligopoly with Asymmetric Information: Differentiation in Credit Markets, *Rand Journal of Economics* 30, pp. 375-396.

Williamson, S., 1987, Transaction Costs, Inflation and the Variety of Intermediation Services, *Journal of Money, Credit and Banking* 19, pp. 484-498.

Appendix 1. The Uniqueness of $\tilde{s}$ and $\tilde{\sigma}$

We complete the proof of proposition 1 by showing that the threshold levels of s and σ defined by (12) and (13) are unique. Consider the following function

$$\omega(s) = s + \frac{p_e(e(s))\delta}{1-\delta p(e(s)) + p_e(e(s))e(s)\delta} \tag{A1.1}$$

instead of (12). Differentiating ω with respect to s gives

$$\frac{d\omega}{ds} = 1 + \frac{\delta p_{ee}(1-\delta p)}{(1-\delta p + p_e e\delta)^2}\frac{de}{ds} \tag{A1.2}$$

Differentiating (10) with respect to e and s shows that $de/ds \leq 0$ and hence (A1.2) is unambiguously positive. Because ω is strictly increasing in s, it follows that there is only one $s = \tilde{s}$ such that $\omega(\tilde{s}) = 0$.

The proof for the uniqueness of $\tilde{\sigma}$ is fairly tricky. Recall from (11) that the sign of $de/d\alpha$ is given by the sign of

$$\Omega(\sigma) = \frac{p_e pm(1-\sigma)}{\tau} - \frac{p_e\delta(1+es)}{1-\delta p} - s\,. \tag{A1.3}$$

By using the first-order condition (10), $\Omega(\sigma)$ can be redefined as

$$\Omega(e(\sigma)) \equiv \frac{1}{\alpha}\left[1 - \frac{p_e(e(\sigma))}{1-\delta p(e(\sigma))}\left(\frac{m}{n} - \delta e(\sigma)\right)\right]. \tag{A1.4}$$

We want to prove that there is only one $\sigma = \tilde{\sigma}$ such that $\Omega(e(\tilde{\sigma})) = 0$. To do this, we show that whenever $\sigma = \tilde{\sigma}$, $d\Omega/d\sigma < 0$. Because $de/d\sigma < 0$ by remark 1, the sign of $d\Omega/d\sigma$ is given by the sign of $-\partial\Omega/\partial e$. Taking the partial derivative of Ω from (A1.4) with respect to e, shows that the sign of $-\partial\Omega/\partial e$ is given by the sign of

$$\frac{1}{\alpha(1-\delta p)}\left[p_{ee}\left(\frac{m}{n} - \delta e\right) - p_e\delta + \frac{\delta p_e^2}{1-\delta p}\left(\frac{m}{n} - \delta e\right)\right],$$

which can be rewritten by using (A1.4) as

$$\frac{p_{ee}}{\alpha(1-\delta p)}\left(\frac{m}{n} - \delta e\right) - \frac{p_e\delta}{1-\delta p}\Omega(e(\sigma)). \tag{A1.5}$$

Because, by the proof of remark 1, $pm > en$, the first term in (A1.5) is always strictly negative. As a result, when $\sigma = \tilde{\sigma}$ so that $\Omega(e(\tilde{\sigma})) = 0$, (A1.5) is strictly negative. In sum, if $\sigma = \tilde{\sigma}$, $-\partial\Omega/\partial e$ and hence $d\Omega/d\sigma$ are strictly negative. Thus there can be only one $\sigma = \tilde{\sigma}$ such that $\Omega(e(\tilde{\sigma})) = 0$.

QED

Appendix 2. Interest Rate Competition

Let us first introduce some notation. To sharpen the discussion we need to specify the net return for a unit of deposits invested. With a slight abuse of the notation, we write the net return as

$$m = yd\text{-}1 \tag{A2.1}$$

where we continue to normalize the repayment obligation of banks, ie the debt the banks owe to depositors, to unity and where y denotes the gross return on a unit of funds invested. Without loss of generality, we also employ assumption 1 in this appendix.

The purpose of this appendix is to demonstrate that our main findings are insensitive to the assumptions on the underlying interest rate competition. For the full analysis of the interest rate competition and information disclosure, we refer the reader to Cordella and Levy Yeyati (1998a, b) and Matutes and Vives (1996, 2000). To minimize the introduction of new variables, we continue to normalize to unity banks' debt to depositors. As a result, we can let d_i refer to the inverse of the deposit interest factor (interest rate plus one) of bank i. This means, among others, that the net return in (A2.1) should be indexed, ie $m_i = yd_i\text{-}1$.

The choice of the interest rate is made simultaneously with the choice of p_i. The depositors observe the chosen deposit interest rates, and the banks are able to commit to them. For tractability, we exclude signaling games by assuming that uninformed depositors do not update their prior beliefs on the basis of quoted deposit interest rates. This means that the beliefs are fixed but fulfilled in equilibrium.

The analysis proceeds as in equations (1)-(8), except that the total supply of deposits is now given by

$$D_i = \frac{1}{n} + (1-\sigma)\left[\frac{\alpha(p_i - \overline{p}) + (1-\alpha)(p_i^e - \overline{p}^e)}{\tau}\right] - \frac{d_i - \overline{d}}{\tau}. \tag{A2.2}$$

As before, bank i maximizes its charter value. Using (A2.1) and (A2.2), symmetry and rational prior beliefs, the first-order conditions for the decision variables p_i and d_i can be written as

$$p_e\left[\frac{\alpha p m(1-\sigma)}{\tau} + \frac{1}{1-\delta p}\left(\frac{m}{n} - \delta c\right)\right] - s\alpha = 1, \tag{A2.3}$$

and

$$d = \frac{\tau}{n} + \frac{1}{y}. \tag{A2.4}$$

Rewriting (A2.4) by means of (A2.1) as $m = y\tau(n)^{-1}$ and inserting it into (A2.3) results in an expression that implicitly determines e:

$$p_e\left[\frac{\alpha p y(1-\sigma)}{n} + \frac{1}{(1-\delta p)}\left(\frac{y\tau}{n^2} - \delta c\right)\right] - s\alpha = 1. \tag{A2.5}$$

Totally differentiating (A2.5) reveals that the sign of $de/d\alpha$ is determined by the sign of

$$\frac{p_e py(1-\sigma)}{n} - \frac{p_e \delta(1+se)}{1-\delta p} - s\,. \tag{A2.6}$$

Note that equation (A2.6) is essentially identical to (11). Hence, using the same argumentation as in the proof of proposition 1, it can be verified that if the coverage of the DIS is sufficiently broad, $de/d\alpha < 0$.

For the present purposes, the main message of this analysis and (A2.6) is that one can exclude interest rate competition from the analysis of transparency without loss of generality.

Appendix 3. Pricing of Deposit Insurance

In the basic model the funding of deposit insurance was implicit. We now make it explicit and consider the two most common pricing systems of deposit insurance: flat-premium and risk-based pricing.[1] In this appendix we return to the basic model of section 2, ie transparency regulation involves neither direct compliance costs nor information spillovers.

Flat-Premium Pricing of Deposit Insurance. Introducing flat-premium pricing is easy. The only change is that the net return (A2.1) from appendix 2 should be re-expressed as

$$m(\phi) = yd(1-\phi)-1, \tag{A3.1}$$

where ϕ denotes the flat insurance premium on a unit of funds insured. By using (A3.1), the analysis of section 2 is fully valid under flat-premium pricing of deposit insurance. In particular, the first-order condition (8) can now be rewritten as

$$\Phi - F\phi = 1, \tag{A3.2}$$

where Φ denotes the left-hand side of the first-order condition in (8) and F is a positive coefficient of the flat premium, defined as

$$F \equiv p_e yd\left[\frac{\alpha p(1-\sigma)}{\tau} + \frac{1}{(1-\delta p)n}\right]. \tag{A3.3}$$

The first term in F captures the supply response of deposits to changes in the bank's risk profile. Basically this means that payments to the deposit insurance system increase as success probability increases, which dilutes the incentive to be prudential. The second term in F captures the effect of flat-premium pricing of deposit insurance on banks' profits and charter value, which also acerbates moral hazard problems in the banking sector. In sum, because $F > 0$, a flat deposit insurance premium on a unit of insured funds reduces the equilibrium values of e and p.

It is easy to see from (A3.2) and (A3.3) that introducing the direct or indirect compliance costs of transparency regulation would yield essentially similar findings as in section 3. The only difference is that, because $\partial F/\partial \alpha > 0$, the flat-premium pricing of deposit insurance further restricts the scope for welfare-improving transparency regulation.

Risk-based Pricing of Deposit Insurance. We now show how the risk-based premium is a source of transparency costs. We assume that the insurance premium can be conditioned on the actual bank risk and that the premium is fairly priced. Under these assumptions, Bank i's value function can be rewritten as

[1] In a recent survey of 68 countries, Garcia (1999) reports that the premiums base is in 34 countries the insured deposits and in 27 countries the entire deposits stocks. Our qualitative results hold under either assumption. Garcia (1999) also notifies a significant increase in the use of the risk-based premiums over the past decade.

$$V_i = \frac{\delta(\pi_i - \rho_i)}{1 - \delta p_i}, \tag{A3.4}$$

where the insurance premium, ρ_i, satisfies the fair-pricing condition

$$\rho_i = (1\text{-}p_i)\sigma D_i. \tag{A3.5}$$

Maximizing first (A3.4) with respect e_i, using equations (4), (5) and (A3.5), and then imposing rational prior beliefs and symmetry on the first-order condition yield

$$\Phi\text{-}R\rho = 1. \tag{A3.6}$$

where Φ denotes the left-hand side of (8), $\rho = (1\text{-}p)\sigma/n$ and R is a coefficient of the risk-based premium, defined as

$$R \equiv p_e\left[\frac{\alpha(1-\sigma)n}{\tau} - \frac{1-\delta}{(1-p)(1-\delta p)}\right]. \tag{A3.7}$$

In (A3.7), the first-term in R characterizes the supply response of deposits to changes in the banks' risk profile, and the second term captures the effect of risk-based pricing of deposit insurance on the bank's charter value. This effect of payments to the insurance system on the charter value is twofold. On the one hand, the charter value decreases because of the payments. On the other hand, the incentive to be prudential is strengthened, since prudential banks pay less to the insurance system. The second-term in equation (A3.7) shows that the latter effect dominates, so that the risk-based DIS reduces financial fragility, unless the supply response of deposits to changes in banks' risk-profile is strong. What is important here is that the magnitude of the supply response in (A3.7) depends on α. The following result emerges:

PROPOSITION A.1. Under a risk-based deposit insurance premium, an increase in the transparency requirement may increase the probability of bank failure.

Proof: Differentiate (A3.6) with respect to e and α to see that the sign of $de/d\alpha$ is given by

$$pm - \sigma(1-p). \tag{A3.8}$$

Note that, under a risk-based premium, e may be either decreasing, increasing or non-monotonic in σ and therefore it is difficult to sign (A2.8) in terms of σ. In any case, the expression in (A3.8) increases as m increases. Thus there exists an $\tilde{m}$ such that

$$p(e(\tilde{m}))\tilde{m} - \sigma\left[1 - p(e(\tilde{m}))\right] = 0 \tag{A3.9}$$

Finally, if $m < \tilde{m}$, then $de/d\alpha < 0$, which proves our claim.

QED

Appendix 4. Voluntary Information Disclosure

In this appendix we prove our claim that the banks do not voluntarily provide any information on their risk-profiles. Let α_i refer to the transparency of bank *i*, and assume it is a decision variable for bank *i*. Suppose that $\alpha_i \in [0,1]$ and that it is chosen simultaneously with p_i.

PROPOSITION A.2. There is no information disclosure in the market equilibrium without regulatory intervention.

Proof: We derive the explicit proof under assumption 1, ie transparency regulation is assumed to cause direct compliance costs. The proof for the indirect costs is perfectly analogous. Index the αs included in (4)-(6) and take the derivative of the value function with respect to α_i so as to see that the sign of $\partial V_i/\partial \alpha_i$ is determined by the sign of

$$(1-\sigma)\frac{p_i m}{\tau}\left(p_i - p_i^e\right) - 1 - se_i . \qquad \text{(A4.1)}$$

Imposing rational prior beliefs on (A3.1) immediately yields that $\partial V_i/\partial \alpha_i$ is everywhere negative.

QED

A quick inspection of (A4.1) explains this finding. The banks would disclose information if it were remunerative. However equation (A4.1) reveals that such a possibility can arise only if the depositors systematically underestimate the success probability. This possibility can be excluded by the standard rationality assumption.

In looking merely at the first-order conditions, our discussion of the voluntary information disclosure admittedly remains sketchy, and there might be other reasons why information disclosure might be remunerative, eg it might be a signaling device. But the possibility of a signaling game is excluded by assumption from the outset in our model. It is also clear that if the information created by motoring investments is a public good, the banks have an incentive to engage in information exchange after the investments are sunk. In other words, there are gains from trade. One could perhaps construct games where these gains are realized. We, however, conjecture that our claims would hold even if information were disclosed voluntarily, provided that the mandatory disclosure requirements were stronger than the voluntary information disclosure. It is indeed difficult to see why transparency would be such an issue in the first place, if it were profitable for banks.