9 Bank regulation, reputation and rents: theory and policy implications

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1 Introduction

US bank regulation, and more particularly the government deposit insurance system, is widely believed to be obsolete and substantially to blame for hundreds of billions of dollars of taxpayers' losses stemming from the recently deteriorating performance of the US banking system. With the Federal Deposit Insurance Corporation's Bank Insurance Fund nearing exhaustion, a sense of urgency has gripped Washington and the banking community, prompting a variety of proposals for banking reform. In this paper, we derive implications for bank regulation from a reputational model of financial intermediation. En route, we examine the various reform proposals that are part of the debate on US banking reform. Our ideas, however, transcend the specifics of US banking and therefore allow us to discuss contemporary developments in European banking.

Most analyses of banking regulation focus on deposit insurance that permits banks to finance risky assets with governmentally insured liabilities. The moral hazards created by a fixed-rate, risk-insensitive deposit insurance system are widely acknowledged; any increase in the underlying asset risk benefits the banks' shareholders to the detriment of the deposit insurer (see Merton, 1977). Recently, John, John and Senbet (1991) have argued that these moral hazards are induced simply by the presence of risky debt, and represent just another example of the conflict of interest between debt and equity holders. This suggests that the benefits to shareholders of increasing asset risk may have little to do with deposit insurance per se. However, as we will see, this conclusion is unwarranted.

The extant literature has for the most part overlooked the effect of regulation on the reputation-building incentives of financial institutions. We will demonstrate how, in the context of a *dynamic* model of financial intermediation, reputational considerations have become increasingly important with the erosion of monopoly rents previously available in a

less competitive setting. Reputation allows banks to lower their market-determined funding costs. We show that banks may have an incentive to avoid risk by expending greater effort on monitoring in order to create these funding-related reputational benefits. This benefit is, however, available only to banks that are uninsured. Several results follow. First, funding-related reputational benefits and (monopolistic) rents are substitutes in that both encourage banks to monitor. Second, by fixing the banks' future funding costs, deposit insurance destroys the funding-related benefits of reputation. We argue that, in a less competitive environment, risk-insensitive deposit insurance might be viable since monopolistic rents alone may encourage optimal monitoring. This would explain why fixed-rate deposit insurance might have worked tolerably well in the past.

Another finding is that funding-related reputational benefits are strictly increasing in the observable risk of the banks' assets, and negligible for safe assets. This supports the various narrow bank proposals for banking reform. A distinguishing feature of the narrow bank proposals is that they restrict the use of insured deposits, but allow greater freedom in the banks' usage of uninsured deposits. This dichotomy is also suggested by our results. Limited insured deposits to the funding of safe assets ensures that the sacrifice of funding-related reputational benefits is minimized. For most other activities of the banks, prudent behaviour is motivated by the use of uninsured deposits that preserve funding-related reputational benefits. This approach to reform contrasts with that proposed by the US government (US Treasury, 1991).

The remainder of the paper is organized as follows. Section 2 presents our theoretical results. Section 3 discusses changes in the competitive environment of US banking and examines implications for the effectiveness of proposed reforms. The paper concludes with a discussion of the lessons of the US experience for European banking.

2 The formal analysis

2.1 Moral hazard in banking

We consider a model of financial intermediation in which banks invest in assets with partially observable credit risk characteristics. A bank's assets consist of loans extended to entrepreneurs to fund projects.[1] By construction, banks have inherently different monitoring abilities, and they also choose the intensity of their monitoring effort. Monitoring ability as well as actual monitoring are unobservable to all save the bank itself. The monitoring of the bank influences the borrower's choice of project and

therefore the bank's risk. For simplicity, we assume that the bank lends to a single entrepreneur and that the entrepreneur's choice of project affects the project's risk, but not the expected return. Thus, all projects offer the same (positive) expected net present value but differ in mean-preserving spread of returns. The project choice is unobservable to the lender, but, given (partial) debt financing, the entrepreneur will optimally maximize risk in the absence of monitoring.[2] Moreover, at any loan interest rate, the bank's expected payoff is strictly *decreasing* in the risk choice of the entrepreneur.[3] The bank's cost of monitoring depends on its monitoring *ability*. A bank with greater ability has lower costs for any chosen level of monitoring effort. Monitoring ability varies across banks and, like monitoring effort, is unobservable to all save the bank. A bank monitors with intensity $m \in (\underline{m}, \bar{m})$, and the risk of an entrepreneur's project is strictly decreasing in m. Let τ^* be the entrepreneur's choice of risk, then $\partial\tau^*/\partial m < 0$. Note that, absent considerations of costs, monitoring always improves a bank's expected (gross) returns from lending, in the sense of first-order stochastic dominance. Given the positive costs of monitoring, a bank will choose the first-best monitoring effort only if fully self-financed.

In several recent papers, the banks' moral hazard problem is described as one where the banks' returns are subject to a mean-preserving spread (see Chan, Campbell and Marino, 1991, and Merton, 1977). This characterization is isomorphic to the incentive conflict of our entrepreneurs in that banks are assumed to choose the mean-preserving spread of their assets directly. Given partial debt financing, banks will then optimally maximize risk. As in our formulation, the moral hazard problem requires that the banks' behaviour is only privately observed.[4] Mean-preserving moral hazard, however, is problematic. Bank assets are principally debt and a mean-preserving spread is possible therefore only if banks quote higher interest rates for riskier loans.[5] Since the agency problem is generally rooted in the unobservability of risk choices, however, loan interest rates should then be unobservable. Otherwise they could be used to infer the banks' risk-choices.[6] If loan interest rates are observable and reflect asset risk, binding contracts could be written on the loan interest rates, and the banks' risk-seeking incentives could thereby by mitigated. For example, interest loan rates could be used *ex post* to determine the correct risk premium for the banks' debt or the deposit insurance premium.[7]

Hence, the banks' debt-type assets distinguish their asset-substitution problem from that of firms that hold physical assets or equity claims. The bank–depositor conflict therefore seems more likely to be expressed in terms of the unobservable choice of effort of the bank that influences the riskiness of a borrower's project.

2.2 *The model*

At the beginning of each of two periods a bank chooses a one-period loan asset. The loan amount is \$1. Let $x(\theta)$ denote the payoff to the bank; the payoff is either $\bar{x}(\theta) > 0$, or 0. In the state $x = \bar{x}(\theta)$ the project succeeds and the entrepreneur fulfils the terms of the loan contract; in the state $x = 0$ the entrepreneur defaults totally. The parameter θ is an index of *observable* risk characteristics, with $\theta \in (\underline{\theta}, 1)$, where higher values of θ imply less risk. Since a safer loan pays a lower interest rate, we have $\partial\bar{x}(\theta)/\partial\theta < 0$. We let $m \in (\underline{m}, \bar{m}) \subset (0, 1)$ be the bank's choice of monitoring. The probability distribution of the bank's return in each period is as follows:

$$x = \begin{cases} \bar{x}(\theta) & \text{with probability } \theta + m[1-\theta] \\ 0 & \text{with probability } [1-m][1-\theta] \end{cases} \tag{1}$$

The representation in (1) has the following properties (see Appendix):

(i) monitoring improves the bank's return in a first-order stochastic dominance sense, and
(ii) the marginal benefit of monitoring decreases in θ (monitoring is less beneficial for safer projects).

The bank's moral hazard is rooted in its choice of m. We examine this problem in the context of a model where the bank's reputational concerns could ameliorate the moral hazard problem. For tractability, we employ a two-period model wherein a bank is privately informed about its monitoring costs. This construction follows Boot, Greenbaum and Thakor (1992), Chemmanur and Fulghieri (1991) and Milgrom and Roberts (1982), and incorporates an incentive for reputation acquisition in a finite-period model.

A bank is one of two types. A type Z has zero monitoring costs, while a type C faces a strictly positive and convex monitoring cost schedule, $V(m)$. By assumption, $V(m)$ is twice continuously differentiable in m over the interval $(\underline{m}, \bar{m})$. The bank knows its own type; others have only a prior belief π at date 0, where $\pi \in (0, 1)$ is the probability that the bank is of type Z.

The type C bank is to all appearances identical to a type Z bank at date 0. Owing to cost considerations, a type Z bank will always choose $m = \bar{m}$. Type C's choice of monitoring will depend on $V(m)$, the effect of monitoring on the bank's expected return, and also on the *future* benefits of monitoring. These more remote benefits have two aspects. First, monitoring reduces the probability of loan default and thus enhances the present value of future rents. Note that, if $x = 0$, the bank is terminated and future

rents are lost. Second, a positive first-period return provides reputational benefits in the form of lower second-period funding costs. The funding advantage is linked to the market's date-1 posterior belief about the bank's type. Since a type Z bank enjoys a higher probability of realizing $x = \bar{x}(0)$, any bank realizing that state will be favoured. Therefore, in the second period we have two types of banks: *de novo* banks with reputation π, and surviving banks with a better reputation.[8]

2.3 *Capital regulation and moral hazard*

The question we pose in this section is whether capital regulation can mitigate the bank's moral hazard. We will show that, in this respect, capital regulation may be counterproductive. While this result is not derived in full generality, it is argued that this result is supported by a large body of theoretical research. Moreover, our intention in this paper is *not* to analyse capital regulation in detail, but rather to emphasize that a market-rooted reputation-preserving design of the regulatory environment of banks is desirable.

Consider first a single-period version of our model. The bank has \$1 in assets. Let \$$a$ be the equity contribution of the owner/manager. Capital regulation then determines how much of the remaining $[1 - a]$ is contributed by outside equity holders or depositors.[9] The monitoring cost, $V(m)$, can be thought of as the monetary equivalent of the monitoring effort devoted by the bank's owner/manager. This interpretation seems natural for a small institution, but less so for larger banks. Alternatively, we can view $V(m)$ as monitoring costs paid by existing shareholders. With these preliminaries, we have the following (see Appendix).

Lemma 1: A capital requirement reduces the monitoring effort and hence the asset quality of the bank.

The intuition is that capital regulation dilutes ownership and therefore reduces monitoring incentives. Although Lemma 1 depends on the standard agency theory assumption of disproportionate sharing of monitoring costs between new and existing shareholders (see Jensen and Meckling, 1976), it is readily generalized.[10]

Lemma 1 casts doubt on the effectiveness of capital regulation for containing moral hazard in banking. Others who have modelled moral hazard in banking also find no beneficial incentive effect of capital requirements on asset quality. For example, in a mean-variance framework with utility-maximizing banks, both Kahane (1977) and Koehn and Santomero (1980) show that capital requirements increase asset risk.[11] Others who have focused on banks that maximize the value of equity find

that banks seek to maximize (mean-preserving) risk to exploit deposit insurance (see Kareken and Wallace, 1978). In that environment, however, the benefit of increasing risk decreases with the capital requirement (see Furlong and Keeley, 1989). Nevertheless, maximizing risk remains optimal unless the capital requirement is 100 per cent.[12, 13]

Like any corporation, a bank may have an incentive to choose an interior capital structure. Maximizing leverage may be suboptimal because of the losses of informational and deposit rents associated with insolvency. Also off-balance sheet activities involving unfunded *contingent* obligations may impose *dissipative* costs on a bank's clientele in the event of bank default (e.g. it may disrupt trade that depends on *credible* letters of credit). Hence, banks may not be competitive in these activities unless adequately capitalized.[14] Thus, maximizing leverage is unlikely to be privately optimal for a bank. Why then might capital regulation be needed? The traditional answer is that banks and the payment system serve a special role in the economy and bank defaults produce negative externalities. The government might then wish to compel banks to hold capital beyond their privately optimal choices.[15] Another possible reason for capital requirements is the risk of bank runs deriving from the *liquidity role* of banks (see Diamond and Dybvig, 1983). Since the bank-run argument is based on costs associated with the liquidation of the bank's assets, higher capital requirements may convince the public that the value of assets net of liquidation costs will not fall below the value of deposits.

Our analysis focuses on moral hazard in the bank's choice of monitoring. We have emphasized that capital regulation might have little beneficial effect on moral hazard, or may even aggravate it. In the next sections, we will show that reputational considerations, and in particular the benefits associated with an enhanced reputation, may mitigate moral hazard.

2.4 *The main results*

2.4.1 *The bank's choice of monitoring in the absence of deposit insurance*

The next step is to analyse the bank's choice of monitoring in a two-period model. We ignore capital requirements, and let the \$1 asset be funded by deposits.[16] We first consider the case where deposits are uninsured. Thus, the cost of deposits will reflect the market's perception of the bank's type, thereby subsuming the anticipated choice of monitoring. We assume that the supply of deposits is perfectly elastic; thus depositors require an expected return equal to the risk-free interest rate, r. Let $\bar{r}$ be the nominal return that guarantees an expected return r. The

second-period choice of monitoring of a type Z bank is $\bar{m}$, but a type C bank chooses m_2 to solve,

$$\underset{m_2}{\text{Max}}\ \{\theta + m_2[1-\theta]\}[\bar{x}(0) - \bar{r}] - V(m_2). \tag{2}$$

The incentive for a type C bank to exploit moral hazard and reduce monitoring is most compelling in the final period, since in that period monitoring does not provide reputational benefits, nor are any future rents at stake. Therefore, we may assume, without loss of generality, that (2) is maximized for $m_2^* = \underline{m}$.[17] With these preliminaries, we can derive the second-period funding cost of a bank with reputation ϕ, where ϕ is the probability that the bank is perceived to be of type Z at the outset of the second period. The correct second-period funding cost for a type Z bank is $r_Z = r\{\theta + \bar{m}[1-\theta]\}^{-1}$, and for a type C bank it is $r_C = r\{\theta + \underline{m}[1-\theta]\}^{-1}$, Thus, for a bank with reputation ϕ, the second-period funding cost is

$$\begin{aligned} r_\phi &= \phi r_Z + [1-\phi] r_C \\ &= \phi r\{\theta + \bar{m}[1-\theta]\}^{-1} + [1-\phi] r\{\theta + \underline{m}[1-\theta]\}^{-1}. \end{aligned} \tag{3}$$

Given the bank's choice of first-period monitoring, $\bar{m}$ for a type Z and $m_1 \in (\underline{m}, \bar{m})$ for a type C, we can derive the following expression for the date-1 reputation.[18] We focus on the state realization $x = \bar{x}(0)$.[19] Then,

$$\phi_1 = \frac{\pi\{\theta + \bar{m}[1-\theta]\}}{\pi\{\theta + \bar{m}[1-\theta]\} + [1-\pi]\{\theta + m_1[1-\theta]\}}. \tag{4}$$

Define $R(\phi_1) \equiv r_\pi - r_{\phi_1}$, where $R(\phi_1)$ measures the reduction in second-period funding costs due to a gain in reputation of $[\phi_1 - \pi]$. A type C bank faces the following maximization problem at date 0:

$$\begin{aligned} \underset{m_1}{\text{Max}}\ H = &\{\theta + m_1[1-\theta]\}\{\bar{x}(0) - r_\pi \\ &+ \{\theta + \underline{m}[1-\theta]\}\{\bar{x}(0) - r_\pi + R(\phi_1)\} - V(\underline{m})\} - V(m_1). \end{aligned} \tag{5}$$

The first-order condition of (5) is

$$\begin{aligned} &[1-\theta]\{\bar{x}(0) - r_\pi\} + [1-\theta]\{\{\theta + \underline{m}[1-\theta]\}\{\bar{x}(0) - r_\pi\} - V(\underline{m})\} \\ &\qquad + [1-\theta]\{\theta + \underline{m}[1-\theta]\} R(\phi_1) = V'(m_1^*). \end{aligned} \tag{6}$$

This shows that the first-period choice of monitoring depends on the effect of monitoring on current returns as well as on the expected rents, $\{\theta + \underline{m}[1-\theta]\}\{\bar{x}(0) - r_\pi\} - V(\underline{m})$, and on the expected reputational benefits $\{\theta + \underline{m}[1-\theta]\} R(\phi_1)$ in the second period.[20] The last term represents the funding cost advantage of a surviving institution. We can now derive the following result.

Proposition 1: The bank's choice of first-period monitoring is strictly increasing in the expected second-period rents and funding-cost related reputational benefits.

From Proposition 1, rents and reputational benefits are *substitutes* in that both reduce the moral hazard associated with the bank's choice of monitoring.

2.4.2 Deposit insurance and the bank's choice of monitoring

In many countries, bank depositors are governmentally insured. Generally, the insurance is limited to deposits below a pre-specified amount. However, regulators often have responded to bank crises by protecting virtually all depositors. Although the design of deposit insurance differs across countries, nearly all Western countries have some variant. In some, it is an industry arrangement with a narrowly restricted governmental role, as in Germany for example, while in others the insurance system is more substantially governmental, as in the US. The insurance premia, where levied, tend to be independent of the riskiness of the insured institution.

Risk-insensitive deposit insurance premia encourage risk taking (see Ronn and Verma, 1986, and Merton, 1977). In our setting, they discourage monitoring. John, John and Senbet (1991) correctly note that the moral hazard incentives that previous authors have attributed to deposit insurance are induced by the presence of debt. Deposit financing creates a convexity in the levered equity payoff and the standard agency conflict between debt and equity holders leads to distortions that have little to do with deposit insurance or its pricing. All these authors have, however, focused on single-period models. This is important because the arguments of John *et al.* are valid only in a *static* setting. In a dynamic setting, we will show how deposit insurance affects the bank's moral hazard independently of the distortion associated with debt financing.

Fixed-rate (risk-insensitive) deposit insurance in effect freezes the bank's funding costs. With complete (and credible) deposit insurance, the bank obtains deposits at the risk-free interest rate. Its total cost of funds is the sum of the insurance premium and the risk-free interest rate. Thus, the bank's total cost of funds is independent of the reputation of the bank. In our model, the expected reputational benefit, $\{\theta + \underline{m}[1-\theta]\}R(\phi_1)$, in the bank's second-period funding cost (see equation (6)) disappears. Assuming that the deposit insurance premium is set so that the deposit insurer breaks even across all banks and that we hold the number of banks fixed across time periods, we have the following:

Proposition 2: The bank's choice of first-period monitoring is strictly lower with a system of fixed-rate deposit insurance than in the absence of deposit insurance.

Hence, fixed-rate deposit insurance aggravates the bank's moral hazard problem. Since the bank knows that with deposit insurance it cannot lower its future funding costs, there is no reputational benefit to monitoring and it is therefore discouraged. If we assume additionally that fixed-rate insurance is provided below cost, the discouragement of bank monitoring may be offset by the additional expected rents earned by the bank.[21] Only upon default would these rents be lost, and monitoring reduces the probability of default. Subsidies are formally identical to the rents mentioned in Proposition 1, and, as stated there, improve the bank's choice of monitoring. Deposit subsidies have been imbedded in deposit insurance, historically, but these subsidies are an independent instrument whose impact should be analysed separately from that of deposit insurance.

2.4.3 Deposit insurance and the competitiveness of the financial system

It does not follow from the observation that fixed-rate deposit insurance aggravates the bank's moral hazard problem that such deposit insurance is not incentive compatible. For example, sufficient rents in the banking system may entice banks to monitor optimally (see Proposition 1). Such rents substitute for the reputational benefits that a fixed-rate deposit insurance system subverts. A more intrusive monitoring role of the government may further constrain moral hazard.

The question of incentive compatibility is important because the banking systems in most Western countries have displayed remarkable stability for decades, despite fixed-rate deposit insurance. We will argue that the stability was rooted in the legal and regulatory restrictions on competition in the US and in intra-industry cartel agreements in Western Europe. Monopoly rents therefore induced low-risk strategies, and the attendant suppression of funding-related reputational benefits – an artefact of deposit insurance – proved inconsequential. Recent increases in competition, particularly in the USA, have dissipated banking rents (see Keeley, 1990) and thereby reduced the banks' incentives to monitor. Asset quality has therefore deteriorated (see Chan, Greenbaum and Thakor, 1986).

2.4.4 Observable risk, reputation and bank monitoring

We have thus far ignored θ, the measure of *observable* risk characteristics, either the risk of a specific asset category, or the average risk of bank assets. Proposition 3 states the main result of this section.

Proposition 3: The funding-related expected reputational benefits of a surviving institution, $\{\theta + \underline{m}[1 - \theta]\}R(\phi_i)$, are *strictly increasing* in observable risk (decreasing in θ).

The reputational benefits attainable in the absence of deposit insurance are greater for riskier assets.[22] Thus, the reputational value of monitoring, destroyed by a system of fixed-rate deposit insurance, is strictly greater for riskier assets.[23] Given that monitoring is more important for riskier assets, Proposition 3 shows that it is potentially costly to let banks fund *risky* assets with insured deposits. Given that the asset risk faced by banks has increased in the past decade, in the sense of a decline in θ, Proposition 3 then suggests that deposit insurance has become increasingly costly in terms of the losses of funding-related reputational benefits.

3 The changing environment of banking: the US experience and its implications for Western Europe

3.1 The competitive environment of US banking

Bank failures and loan losses have reached alarming levels in the US. With the near exhaustion of the FDIC's Bank Insurance Fund, a sense of urgency has gripped the banking community, and the government too. Many believe that the current regulatory structure, including the deposit insurance system, is obsolete. This has prompted a plethora of reform proposals, including those of the US Treasury (1991).[24]

In the quarter century following World War II, US banking displayed historically abnormal stability. The regulatory structure was then, as it is today, largely based on banking legislation enacted during the 1930s. In particular, the Banking Act of 1933, better known as the Glass–Steagall Act, was a direct reaction to a series of banking panics during 1930–3. Glass–Steagall (modified in the Banking Act of 1935) consisted of three basic elements. First, it created the Federal Deposit Insurance Corporation (FDIC) to insure deposit accounts up to a maximum of $2,500 for a flat insurance premium of less than 10 basis points. Participation in the FDIC insurance system was mandatory for all Federal Reserve member banks. Others, including state-chartered banks that chose not to join the Federal Reserve, could participate if approved by the FDIC. Second, Glass–Steagall restricted the operations of insured banks. The restrictions included limitations on deposit interest payments and a strict separation between investment and commercial banking that prohibited the latter from originating, trading or holding securities other than those of the US Government and general obligations of state and local governments.[25] Finally, together with the McFadden–Pepper Act of 1927, Glass–Steagall elevated entry barriers that reduced competition among banks. Foremost it affirmed the individual states' authority to restrict *de novo* bank charters, inter-state banking and bank holding companies, as well as

other means of consolidation and entry. Further restrictions were introduced with the Bank Holding Company (BHC) Act of 1956, which established the Federal Reserve's hegemony over multi-bank holding companies. The 1970 Douglas Amendments to the BHC Act extended these controls to one-bank holding companies.

The combination of ceilings on deposit interest rates and functional and spatial barriers to entry created an environment in which banks faced only limited competition, and consequently earned substantial rents, most especially on deposits. These monopolistic benefits provided banks with compelling incentives to pursue low-risk strategies, *despite the presence of deposit insurance*. In exchange for these benefits, banks accepted restrictions on their activities and intrusive governmental supervision. As a result, the US has a peculiarly fragmented banking industry with many thousands of small, undiversified banking institutions; i.e. geographically local and functionally specialized institutions.

The redefining event of this story was the stubborn inflation, record-setting interest rates and soaring volatility of the 1970s. With inflation exceeding 10 per cent annually towards the end of the decade, nominal interest rates rose to unprecedented levels, and the opportunity costs of holding interest-rate-constrained deposits exploded. Depositors withdrew from the banking system and invested in largely unregulated mutual funds that offered more competitive returns. This was the cash management revolution that swept both the consumer and corporate sectors. Banks were forced to cope with destabilizing endogenous product innovation and advances in information technology; developments that made it easier for the banks' best customers to gain access to the capital markets and abandon their banks. Adverse selection left the banks with the weaker customers and impaired asset quality.[26]

In their weakened condition, the banks discovered a variety of new competitors. Credit card issuers built a presence in the retail market. Insurance companies entered money management with guaranteed investment contracts and a variety of annuities and also expanded their offering of financial guarantees. At the same time, foreign banks expanded in US markets, concentrating on wholesale banking. Non-bank competitors were not subject to the banks' regulatory restrictions. As a result, the percentage of financial assets held by commercial banks dropped from 35 per cent in 1975 to 27 per cent in 1990 (Mishkin, 1992).

Changes in the US competitive environment dissipated the rents that had sustained the Glass–Steagall design. In particular, latent incentive problems of the fixed-rate deposit insurance system were no longer contained by the risk-abating incentives of the rapidly eroding monopoly rents (see Propositions 1 and 2). In addition, the macroeconomic instability and adverse shifts in the quality of the banks' clientele added to the observable risk of the banks' assets.[27] As indicated in Proposition 3, this inflated the cost of the fixed-rate deposit insurance by destroying more substantial funding-related reputational benefits.

3.2 *The governmental response*

The Treasury's proposal (1991) addressed both the latent flaws of the deposit insurance contract and the declining competitiveness of US banks. No one knows whether the government's programme will become law. It has failed passage once, but has been resubmitted to Congress in somewhat modified form.

First and foremost, deposit insurance reform seeks to realign the divergent incentives of banks and the deposit insurer. The Treasury characterizes the problem in terms of overextension of deposit insurance, weakened financial strength of banks, and fragmentation of regulation. It therefore proposes to reduce deposit insurance coverage, to enhance the role of bank capital, and to intensify supervision.

Clearly, reduced deposit insurance coverage could contain the insurer's exposure, and enhance the potential for funding-related reputational benefits that address the banks' moral hazard incentives. The scope for reduced coverage may, however, be limited. As presently construed, the doctrine of too-big-to-fail (TBTF) weakens the distinction between explicitly insured and uninsured deposits.[28]

The effectiveness of an expanded role for bank capital is unclear. As shown, capital may be counterproductive in combating moral hazard. However, capital does act as a deductible from the viewpoint of the deposit insurer. The Treasury proposes to calibrate deposit insurance premia on the basis of bank capital and also to adjust bank empowerments and frequency of examinations on the basis of the banks' accounting capital.

First, note that the measurement of bank capital is imprecise. Some would address this problem by replacing GAAP (Generally Accepted Auditing Principles) accounting with current value accounting (see White, 1991). This suggestion is, however, misleadingly simple. Banks exist for the purpose of producing liquidity. This means holding non-traded or infrequently traded assets. For these, current value is not well defined. Moreover, the disparate bid–ask spreads of assets are magnified in the capital account as a result of leverage. The problem of measuring capital is further aggravated by problems of deposit and contingent liability accounting. Discounting cash flows, as suggested by some, merely substitutes the difficulties of estimating cash flows and discount rates for

those of identifying a market price. This should not be read as a defence of GAAP accounting, or as a rejection of capital-based regulation. We merely wish to emphasize that bank capital is a fragile construct tied up with the banks' production of liquidity and its warehousing of non-traded assets. Any reform programme that relies heavily on capital-based incentives therefore deserves a wary response.

Were it possible to calibrate deposit insurance premia on the perceived reputation of a bank, the funding-cost-related reputational benefits could be reinstated, and the negative incentive effects of deposit insurance would be mitigated. However, linking premia to capital is tricky at best. Linking bank empowerments to GAAP capital is similarly questionable. Regulators might then be put in a position where they would feel compelled to force a divestiture when the bank suffers a capital impairment. All of this presupposes an informed and time-consistent regulator of a type not widely in evidence.

If one shares our scepticism of capital-related measures, the inference is that the Treasury's principal weapon for controlling moral hazard is increased supervision. It is difficult to quarrel with the calls for improved monitoring. At the same time, it is difficult to think of improved supervision as the centrepiece of a programme to correct the deposit insurance incentive problem. There are at least two problems. First, the rapidly changing banking environment, with an explosive growth of trading, interest-rate, exchange-rate, payments and off-balance-sheet risks, creates an ambience where examiners are perpetually trying to catch up. This severely limits what supervision can achieve. Second, and perhaps more important, supervision is a *discretionary* form of regulation. As such, it relies upon regulatory judgement and ambiguity to ameliorate incentive problems (see Boot and Thakor, 1991). Discretionary regulation introduces a form of non-diversifiable sovereign risk in the market for bank capital. Bankers and bank investors eventually learn that the regulator employs situational standards in implementing closure and more limited sanctions, and the banks' cost of capital is elevated. This may help explain the relatively low price/earnings ratios of US banks in comparison with European competitors.[29,30]

Elsewhere, we have characterized these proposed legislative changes as relying on *indirect regulation* (see Boot and Greenbaum, 1992). The distinction between indirect and direct regulation is that indirect regulation does *not* explicitly prescribe the activities that a bank can undertake, but rather establishes calibrated incentives designed to promote socially desired activities. The Treasury's proposal falls largely into this category. Direct regulation, on the other hand, explicitly limits permitted activities.

The product and geographic restrictions included in the Glass–Steagall Act illustrate direct restrictions. In line with the shift to indirect regulation, the Treasury proposes to expand bank powers for the 'adequately' capitalized to enhance their competitiveness. For the well endowed, geographic restrictions on branch banking and on investment banking activities would be lifted as well.

By contrast, deposit insurance reform based on direct regulation would restrict the asset choices of banks offering insured deposits. Narrow bank is the name recently attached to this proposal (see Litan, 1987). This idea goes back to the 1930s when proposed as '100 percent reserve banking' by Henry Simons (1948). The narrow bank idea restricts banks to holding 'safe' assets with the proceeds of insured deposits. Numerous variants have been articulated, differing mostly in terms of the definition of safe assets. The narrow bank would trivialize the exposure of the deposit insurer. Advantages include less dependence on regulatory monitoring and supervision, and increased flexibility for banks in their usage of uninsured deposits. The latter would improve the competitiveness of US banks globally as well as vis-à-vis less-regulated domestic non-bank financial institutions. The narrow bank also restores the funding-related reputational benefits for all activities that are uninsured, and thus weakens moral hazard incentives. Moral hazard might still be present with insured funds. By restricting their use to safe assets, however, the moral hazard is narrowly circumscribed, and for these assets only few funding-related reputational benefits are at stake (see Proposition 3). A criticism of the narrow bank proposal is that it would isolate the credit from the deposit creation operations of intermediaries. Less restrictive variants (see Benston *et al.*, 1989, and Boot and Greenbaum, 1991), however, permit banks to finance higher-quality, securitized, private credits with insured deposits while retaining much of the certitude of the narrow bank.

Another potential criticism is that banks may not be able to obtain uninsured funding to finance their risky assets. Given the unobservability of monitoring, this problem may arise because the actual riskiness of the banks' (observably) risky assets is unknown. How then would the market be willing to provide uninsured funding to banks that hold these assets? The important underlying question is, therefore, whether the narrow bank type reform proposals would preserve the role of banks in funding these assets. Our answer is that precisely the reputation-building incentives that we have emphasized in this paper should overcome this 'lemon's problem'. In other words, financial intermediaries that have their reputation at stake facilitate the funding of risky monitoring-sensitive assets.

3.3 *Lessons for an integrating Europe*

American banking illustrates the most important pitfall in regulation, i.e. the futility of structural designs that fly in the face of the economics of financial intermediation. The anomalies of US bank regulation have cost taxpayers hundreds of billions of dollars directly and untold additional sums in terms of forfeited competitiveness. And there is still no clear understanding in the public domain of the issues. Deposit insurance has become an entitlement in the US, a political sacred cow, even now that the need for it is less than ever. Given the difficulty of eliminating deposit insurance, the issue becomes one of minimizing the distortions it can be expected to produce. We have argued that the choice is between indirect controls that motivate the bank to choose safe assets and direct controls that require that insured deposits be secured with safe assets. This choice dictates the design of the rest of the banking enterprise. Ultimately, the choice affects the banks' ability to innovate and remain competitive.

What are the implications of our analysis for European banking? Like the US, most West European countries have some type of deposit insurance and regulators also seem reluctant to let individual banks fail. Our analysis indicates that, unless contained by monopoly rents, moral hazard will distort bank decisions in order to exploit the insurer. Here European banking still differs from banking in the US. Protective legislation and intra-industry cartel arrangements, together with the less developed financial markets, continue to provide a supportive environment in which substantial rents are still available. While protected, European banks were less restricted within their home country. Hence, *universal banking* is dominant in Europe, and banks tend to be well diversified. This has undoubtedly contributed to the stability of banking in Europe.

Two major developments will threaten this cosy environment. First, the European integration, based on the principles of *home-country control* and *mutual recognition*, allows unrestricted branching across national borders and thus heralds pan-European banking (see Fitchew, 1990). Second, the European financial markets have lagged behind those in the US, but should be expected to develop quite rapidly. The latter development will allow more corporations to gain access to the financial markets directly and bypass the banks. European banks will not necessarily lose customers, but interest-spread income will be replaced by fee income, although not necessarily unit for unit. Competition will put increasing pressure on cost structures. It should therefore be expected that profitability will diminish, prompting a potentially painful process of exit. Public regulation in the US has inhibited the process of exit and therefore inflated its cost and prolonged the necessary adjustment. The same

principal–agent and time consistency problems can be expected to challenge European bank regulation.[31]

If we are right about the imminent dissipation of monopoly rents, Europe will be confronted with the same difficult choices currently facing the US. In particular, as we have shown, an extensive safety net may not be compatible with a competitive banking industry. We believe that it is critical to reintroduce incentives for reputation-building. For this, it seems necessary to reform the regulatory structure along the lines suggested in the previous sections. The importance of a cross-border payment system in an integrated Europe would suggest a European-wide system of deposit insurance, based, however, on strict asset restrictions. Other activities of the banks would not be insured and would be only weakly regulated. Prudent behaviour would be assured by the desire of banks to maintain their reputation. Indeed, this would put banks on a level playing field with their less regulated non-bank competitors, fostering healthy competition between 'market-disciplined' financial institutions.

Our lessons for Europe can be summarized in terms of Dire Straits, Joni Mitchell, as well as Boot and Greenbaum:

From Dire Straits, we have: 'Denial is not only a river in Egypt.'
From Joni Mitchell we have: 'Don't it always seem to go, you don't know what you've got till it's gone.'
And finally, from our own work: 'Sometimes a little more restraint locally can provide much more freedom globally.'

Appendix

Proof of properties of expression (1)

(i) With a two-state distribution, first-order stochastic dominance holds if the bank's expected output is increasing in m. The bank's expected output is:

$$\mathrm{E}(x) = \{\theta + m[1-\theta]\}\bar{x}(\theta). \tag{A.1}$$

Obviously $\partial \mathrm{E}(x)/\partial m > 0$. (ii) Next we show that the marginal benefit of monitoring is decreasing in θ. This holds if $\partial\{\partial \mathrm{E}(x)/\partial m\}/\partial\theta < 0$. From (A.1) we get $\partial \mathrm{E}(x)/\partial m = [1-\theta]\bar{x}(\theta)$, thus

$$\partial\{\partial \mathrm{E}(x)/\partial m\}/\partial m = -\bar{x}(\theta) + [1-\theta]\{\partial\bar{x}(\theta)/\partial\theta\}. \tag{A.2}$$

Since $\partial\bar{x}(\theta)/\partial\theta < 0$, (A.2) is strictly negative. □

Proof of Lemma 1

Let $a[1-a]$ be the capital contributed by external equity holders. The amount $[1-a][1-a]$ of the funds is contributed by depositors. Note that

a represents the capital requirement; higher values of a imply a more stringent capital requirement. The bank maximizes

$$\underset{m}{\text{Max}}\ L = \frac{a}{a + \alpha[1-a]}\{0 + m[1-0]\}\{\bar{x}(0) - [1-a][1-a]\hat{r}\} - V(m), \tag{A.3}$$

where $\hat{r} = r\{0 + m[1-0]\}^{-1}$. The first-order condition is

$$\frac{\alpha[1-0]}{a + \alpha[1-a]}\{\bar{x}(0) - [1-a][1-a]\hat{r}\} = V'(m^*). \tag{A.4}$$

Next, we show that $\partial m^*/\partial a < 0$. We take the implicit differential of (A.4) with respect to a. This gives,

$$\frac{-\alpha[1-0][1-a]}{\{a + \alpha[1-a]\}^2}\{\bar{x}(0) - [1-a][1-a]\hat{r}\} + \frac{\alpha[1-0]}{a + \alpha[1-a]}\alpha[1-a]\hat{r} = V''(m^*)[\partial m^*/\partial a]. \tag{A.5}$$

The LHS of (A.5) can be written as

$$\frac{-\alpha[1-0][1-a]}{a + \alpha[1-a]}\left\{[1-a]\hat{r} + \frac{\bar{x}(0) - \hat{r}}{a + \alpha[1-a]}\right\} = V''(m^*)[\partial m^*/\partial a]. \tag{A.6}$$

We know that $\bar{x}(0) > \hat{r}$, thus the LHS of (A.6) is strictly negative. Also $V''(m^*) > 0$. Therefore (A.6) implies that $\partial m^*/\partial a < 0$. From (1), we now observe that an increase in a leads to an adverse shift in the bank's output distribution, and thus reduces asset quality. □

Proof of Proposition 1

The proof follows immediately from (6). Note that $V''(m_1) > 0$, thus, if the LHS of (6) increases, $m_\uparrow^*$ is positively affected. □

Proof of Proposition 2

We will prove this proposition by assuming that the insurer sets the insurance premium such that it breaks even in each period across all banks. Since the cross-section of banks has a different reputation on average across periods, the insurance premium in the first period is different from that in the second period. However, the deposit insurance has a fixed-rate premium, which implies that in a given period the

premium is constant across banks. In the first period, the average reputation of a bank is π. The bank's all-in cost of funds (i.e. insurance premium plus the interest rate promised on deposits) is therefore r_π; for details see also note 21. The second-period population of banks consists of a proportion $\eta = \pi\{0 + \bar{m}[1-0]\} + [1-\pi]\{0 + m_1[1-0]\}$ of banks with reputation ϕ_1, and a proportion $[1-\eta]$ of *de novo* banks with reputation π. The fixed-rate fairly priced deposit insurance leads to an all-in second-period funding cost $\tilde{r}(\phi_1)$, with $r_{\phi_1} < \tilde{r}(\phi_1) < r_\pi$. The inter-temporal improvement in funding costs (induced by the cross-sectional improvement in bank quality between date 0 and date 1) equals $\tilde{R}(\phi_1) = r_\pi - \tilde{r}(\phi_1)$. The first-order condition (6) now becomes

$$[1-0]\{\bar{x}(0) - r_\pi\} + [1-0]\{\{0 + \underline{m}[1-0]\}\{\bar{x}(0) - r_\pi\} - V(\underline{m})\} + [1-0]\{0 + \underline{m}[1-0]\}\tilde{R}(\phi_1) = V'(m_\uparrow^*). \tag{6'}$$

Since $\tilde{R}(\phi_1) < R(\phi_1)$ and $V(m_1)$ is strictly positive and convex, we observe from (6') and (6) that the bank's choice of monitoring is strictly lower with fixed-rate deposit insurance than without. This completes the proof of the proposition. □

Proof of Proposition 3

The funding-related expected reputational benefits equal

$$T \equiv \{0 + \underline{m}[1-0]\}R(\phi_1). \tag{A.7}$$

We can use (3) and the definition $R(\phi_1) \equiv r_\pi - r_{\phi_1}$ to write $R(\phi_1)$ as,

$$R(\phi_1) = r[\phi_1 - \pi]\left\{\frac{1}{0 + \underline{m}[1-0]} - \frac{1}{0 + \bar{m}[1-0]}\right\}. \tag{A.8}$$

From expression (4) we can derive

$$[\phi_1 - \pi] = \frac{\pi[1-\pi][1-0][\bar{m} - m_1]}{\pi\{0 + \bar{m}[1-0]\} + [1-\pi]\{0 + m_1[1-0]\}}. \tag{A.9}$$

Next, substitute (A.9) in (A.8), and the resulting expression in (A.7), to get

$$T \equiv \left\{\frac{\pi[1-\pi][1-0][\bar{m} - m_1]}{\pi\{0 + \bar{m}[1-0]\} + [1-\pi]\{0 + m_1[1-0]\}}\right\}\left\{1 - \frac{0 + \underline{m}[1-0]}{0 + \bar{m}[1-0]}\right\} \tag{A.10}$$

From (A.10) we can show immediately that $\partial T/\partial 0 < 0$. (Both expressions in (A.10) are strictly positive, and their first derivatives with respect to 0 are negative.) □

NOTES

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1 We take the details of the debt contract between the entrepreneur and the bank as given. As shown in the costly-state-verification literature, in the absence of asset-selection moral hazard, debt is optimal if the output realization is not costlessly observable to the lender (see Townsend, 1979; Diamond, 1984; and Gale and Hellwig , 1985). Mookherjee and P'ng (1989) show, however, that the optimality of debt depends on the assumption of deterministic monitoring (which is made in these papers). With both asset-selection and 'output-representation' moral hazard, the optimal contract cannot be characterized in general (see Williams, 1989). Boot, Thakor and Udell (1991) show that secured lending can resolve these moral hazard incentives.

2 Let $f(x|\tau)$ be the density function of the return on the entrepreneur's project, where $x \in (0, \infty)$ denotes return and $\tau \in (\underline{\tau}, \bar{\tau})$ the mean-preserving risk parameter; $f(x|\tau_1)$ is a mean-preserving spread of $f(x|\tau_2)$ for $\tau_1 > \tau_2$. Let $\hat{r}$ be the entrepreneur's repayment obligation on the \$1 bank loan. Then τ will be chosen so as to maximize

$$\max_{\tau} L = \int_{\hat{r}}^{\infty} [x - \hat{r}] f(x|\tau) \, dx.$$

Given the specification of $f(x|\tau)$, it now follows immediately that L is maximized for $\tau = \bar{\tau}$.

3 The bank's expected payoff is

$$G = \int_0^{\hat{r}} x f(x|\tau) \, dx + \hat{r}[1 - F(\hat{r}|\tau)],$$

where

$$F(\hat{r}|\tau) = \int_0^{\hat{r}} f(x|\tau) \, dx.$$

Given the specification of $f(x|\tau)$, it is straightforward to show that the bank's expected payoff is strictly decreasing in τ.

4 The agency problem is rooted in the unobservability of the bank's actions and leads to incomplete contracting.

5 With interest-earning assets of identical default risk, banks could affect the variance of their return by creating duration gaps. However, a maturity mismatch presumably is *observable*. Undoubtedly, off-balance sheet *contingent* liabilities are also subject to moral hazard. Boot and Thakor (1991) show that these liabilities actually may weaken the bank's incentive to choose more risk.

6 Yoon and Mazumdar (1991) explicitly use observed loan interest rates to design a risk-based deposit insurance pricing system.

7 It is true, however, that regulators have done little to adjust their actions to *observable* differences in risk. They have thereby created incentives that go beyond exploiting the unobservability of a bank's actions.

8 The return distribution generalizes quite naturally to one with more than two states, and where default occurs only with the worst realization. Then, surviving banks display a variety of reputations and *de novo* banks would all have 'average' reputations. Likewise, it is easy to show that our *qualitative* results are robust with respect to alternative specifications of the closure rule. Our closure rule, i.e. close the bank if state $x = 0$ is realized, is as stringent as possible. As such, it provides the bank with a strong incentive to monitor in the first period (i.e. all future rents are at stake). If, alternatively, it had been assumed that an institution is *never* closed, the bank would have less incentive to monitor. However, even with a more lax closure rule, there would be future benefits of first-period monitoring. That is because the bank's return realization has an effect on its second-period reputation and funding costs. For papers that examine the closure rule as a regulatory instrument see Mailath and Mester (1991) and Davies and McManus (1991). Boot and Thakor (1992) show that regulatory self-interest (i.e. self-serving behaviour by regulators that are concerned about their perceived ability) distorts their closure decision. An implication of the latter is that a closure rule may not be a credible regulatory instrument.

9 Other papers in this area assume that banks earn liquidity rents on deposits, and that therefore, in the absence of bankruptcy costs, deposits are the preferred funding mode (see Giammarino, Lewis and Sappington, 1991). Deriving the bank's optimal capital structure is *not* the focus of our analysis. However, since analysing capital regulation is of interest only if such regulation affects the bank's endogenous choice of capital, we will assume that the bank's capital constraint is binding, and that banks would not otherwise seek external capital.

10 Besanko and Kanatas (1991) analyse the announcement effects of new capital issues. They also distinguish between owner-equity and external capital, but do not focus on the effect of capital on moral hazard. However, it can be shown that, even in their model, capital regulation aggravates moral hazard incentives.

11 They also claim that, depending on relative risk aversion, the *default risk* of a bank increases with required capital. Keeley and Furlong (1990), however, argue that Kahane and Koehn and Santomero mis-characterize the risk–return frontier and therefore that their conclusion regarding default risk is unwarranted.

12 As emphasized earlier, we do not believe that moral hazard based on mean-preserving risk is an appropriate characterization of the bank's incentives.

13 Avery and Berger (1991) analyse risk-based capital requirements and find that asset risk may be negatively related to capital requirements.

14 This argument is implicit in recent discussions of the competitiveness of US banks. Kraus and Evans (1990) argue that US banks are losing market share to European competitors owing to their weak capitalization.

15 Lemma 1 indicates that this might be counterproductive in that monitoring and elevated default probabilities could result. Whereas the negative effect of capital requirements on monitoring is robust with respect to alternative specifications of the return distribution, the link between the default probability and the capital requirement is *not*. With a continuous return distribution, the effect of capital requirements on default risk is ambiguous. Generally, we would expect default risk to be negatively related to the capital requirement; only with extreme distributions of asset returns could the opposite result be obtained. Avery and Berger (1991) show empirically that risk-based capital requirements might be effective in ensuring the negative correlation between default risk and the level of capital requirements.

16 The analysis does not change qualitatively if the owner/manager contributes

equity. The objective of the bank is to maximize the value of the bank to the owner. The net return, if positive, is paid to the owner at each date.

17 This assumption sacrifices no generality because we can easily show that (taking the endogenously determined funding costs into account) a *de novo* bank of type C with future reputational benefits and rents will choose a higher level of monitoring than a surviving bank of type C without future reputational benefits and rents.

18 Consistent with the arguments given in note 17, we focus on interior solutions for the bank's choice of first-period monitoring.

19 Only if the state $x = \bar{x}(0)$ is realized at date 1 can the bank continue. We can therefore ignore the bank's reputation after realizing $x = 0$.

20 While it is true that in equilibrium ϕ_1 depends on the anticipated choice of monitoring m_1 (see (4)), the first-order condition (6) may *not* include the factor $\partial R(\phi_1)/\partial m_1$.

21 In this note we will show that the *timing* of payments of premia for the deposit insurance has *no* effect on the bank's choice of monitoring. Deposit insurance reduces the cost of first-period deposits from r_π to r. From (6) we might be tempted to conclude that this enhances the marginal value of monitoring; i.e. the end-of-period payoff in the good state is $\bar{x}(0) - r$ with deposit insurance, which is higher than the payoff $\bar{x}(0) - r_\pi$ without deposit insurance. Thus, monitoring seems more valuable *with* deposit insurance. This is, however, true only if the bank treats the deposit insurance premium as a sunk cost. While this may be true for most insurance, it is *not* true for deposit insurance. Consider the bank's maximization problem with and without deposit insurance in a single-period setting. Without deposit insurance, the bank maximization problem is

$$\max_m S = [\theta + m(1-\theta)]\{\bar{x}(0) - \hat{r}\} - V(m),$$

where $\hat{r} = r\{\theta + m[1-\theta]\}^{-1}$. The solution follows from the f.o.c. With deposit insurance the bank obtains deposits at cost r. The bank now needs to raise *more* than \$1 of deposits in order to pay for the insurance. Assume that the bank has to raise D deposits, then the fair-priced deposit insurance premium is $p = \{1 - \{\theta + m[1-\theta]\}\}D$. Note that $D \equiv 1 + p$. Thus the bank's repayment obligation to depositors is $[1+p]r = \{1 + \{1 - \{\theta + m[1-\theta]\}\}[1+p]\}r$. This can be rearranged to $[1+p]r = r\{\theta + m[1-\theta]\}^{-1}$. Observe that this is precisely the same repayment obligation as for the bank in the absence of deposit insurance. Thus, banks face the same maximization problem with or without (fairly priced) deposit insurance. For further details and extensions of these arguments, see Emmons (1991). The feasibility of fairly priced deposit insurance is analysed in Chan, Greenbaum and Thakor (1992).

22 The effect on first-period monitoring is more striking yet. The marginal reputational benefit of first-period monitoring is $[1-\theta]\{\theta + \underline{m}[1-\theta]\}R(\phi_1)$, which decreases in θ more rapidly than $\{\theta + \underline{m}[1-\theta]\}R(\phi_1)$.

23 It can be shown that the expected rents, $\{\theta + \underline{m}[1-\theta]\}\{\bar{x}(0) - r_\pi\} - V(\underline{m})$, are higher for riskier assets only if $\partial\{\bar{x}(0) - r_\pi\}/\partial\theta$ is *sufficiently* negative. Therefore, the greater loss of reputational benefits on riskier assets is not necessarily offset by higher rents earned on these assets.

24 To date, numerous competing proposals have surfaced. The Congressional Budget Office (1990) summarizes a non-exhaustive list of twenty-two proposals.

25 This created a distinction between investment and commercial banks built on a tenuous and increasingly artificial distinction between loans and securities.

26 The weaker remaining customers were further impaired when forced to accept floating-rate loans in place of the previous fixed-rate term loans that hedged their interest-rate risk.

27 The quality of the banks' clientele deteriorated for two reasons, both tracing to the shortened duration of bank deposits that resulted from the spread of consumer and business cash management practices. Rising bank interest-rate risk forced the banks from fixed-rate term to indexed (e.g. prime-plus) lending. This prompted the migration of better clients to the capital markets and impaired the weaker remaining customers by increasing their interest-rate risk and the banks' consequent credit risk (see Boot and Greenbaum, 1991).

28 TBTF is a code word for situations where bank regulators consider the implications of a large bank failure unacceptable, and therefore opt to bail out all depositors.

29 The issue of the desirability of regulatory discretion is analysed in recent game-theoretic models of public utility regulation. For example, Blackmon and Zeckhauser (1992) argue that, once a regulated utility has made an irreversible capital investment, that investment becomes vulnerable to expropriation by a regulator. As a result, the cost of attracting capital may rise, and the utility may abstain from desirable investments.

30 The Federal Deposit Insurance Corporation Improvement Act of 1991 attempts to establish rules that limit regulators' discretion. However, it is unlikely that a satisfactory set of rules can be found (see *The Economist*, 15 February 1992).

31 A development that may prolong the cosy competitive environment of European banking is the consolidation that is occurring *within* many European countries. While this might preserve rents in the short run, we are sceptical about its long-term consequences. There is little empirical evidence that mergers between *large* financial institutions create value. On the contrary, diseconomies of scale might be present.

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