ELSEVIER

European Economic Review 38 (1994) 469–487

EUROPEAN ECONOMIC REVIEW

Joseph Schumpeter Lecture

On banking and intermediation

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Abstract

The purpose of this lecture is to develop a framework for the study of prudential regulation and to derive policy implications. Following a discussion of the practice of banking supervision and of the raison d'être of regulation, the paper emphasizes the importance of capital adequacy and balance sheet adjustments to shocks affecting either individual banks or the banking sector as a whole. The ideas are then applied to the policy debates on market value accounting and on the indexation of the capital requirements to the business cycle. The paper concludes with political economy questions and with a discussion of the 'too-big-to-fail' problem.

Key words: Banking regulation; Governance; Capital requirements; Market value accounting; Bank failures

JEL classification: G21; G28; G32

1. Introduction

Financial intermediaries, such as banks, mutual funds, securities firms, investment managers, insurance companies and pension funds, play a crucial role in modern economies. They issue credit and insurance policies to firms and consumers, manage pensions and are the key players on the securities, currencies and derivatives markets. They also, in the case of banks, underlie the payment system. The purpose of this lecture is to sketch how one might go at building a framework for the study of prudential regulation and to derive policy implications. It is organized as follows. Section 2 stresses the

*The author is grateful to Mathias Dewatripont for letting him borrow unrestrainedly from their joint monograph, to Bruno Biais, Mathias Dewatripont and Jean-Charles Rochet for helpful comments, and to the Institute for Policy Reform for financial support.

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SSDI 0014-2921(93)E0075-V

importance of incorporating financial intermediation into microeconomic and macroeconomic modeling. Section 3 discusses the market failures that may make financial intermediation a good candidate for regulatory supervision. Section 4 provides a short introduction to the practice of prudential regulation. Sections 5 and 6 demonstrate the importance of capital adequacy for intermediaries. Sections 7 and 8 look at two topical policy debates: absolute vs relative solvency ratios, and historical cost vs market value accounting. Section 9 derives some principles for prudential regulation. Section 10 studies the extent to which agency incentives and political economy issues may hamper the realization of these objectives. Section 11 focuses on the specific question of whether large banks can fail, and Section 12 concludes. Most of this lecture borrows from ongoing work with Mathias Dewatripont (1993a), to which we refer for a broader selection of topics and for a formal treatment.

2. Financial intermediation and economic theory

Economic theory has traditionally focused on the real sector, viewing intermediation as a veil. Although this regrettable neglect has begun to wane in recent years, much remains to be done. For microeconomists, the lack of a theory of financial regulation leaves aside one of the most sensitive areas of *government intervention* in the economy. Examples of recent large-scale problems in banking alone abound, from Japan (where the financial system was presumed to hold $500 billion in bad loans in 1992)[1] to the United States (with its Savings and Loans debacle which will, according to imprecise estimations, cost $1000 per inhabitant, and its thousand-odd commercial bank failures in the 1980s), not to mention Scandinavia (where many large banks were recently rescued by the governments) and Latin America (many large banks in Argentina, Brazil, Chile and Mexico either failed or were nationalized in the eighties).

Neglecting intermediaries may also bias our rendition of the *microstructure of financial markets*. Modern finance theory has analyzed a relevant link between liquidity needs, transaction costs, information collection and revelation, and trading strategies. A standard interpretation of the models in the literature has individual investors, informed speculators and (mostly) risk neutral arbitrageurs. Formally introducing intermediaries into microstructure theory should be high on our research agenda. For one thing, the key ingredient of this theory, namely information and transaction (stamp duties, brokerage fees) costs associated with the need to sell assets, might be made irrelevant in current modeling by the introduction of financial intermediaries. For instance, in a stationary economy without aggregate shocks, liquidity

[1] *The Economist*, Nov. 7, 1992.

traders who must sell their assets[2] are replaced by an equal number of newcomers. A financial intermediary could act as a depository for the securities held by investors; it would never sell or buy the underlying assets in its portfolio and would simply be a medium by which quitters would hand over their assets (in the form of deposits at the intermediary) to newcomers without incurring the traditional transaction costs.

I here rush to say that financial intermediaries are in fact large liquidity traders themselves and that I find my story of liquidity-draining intermediaries utterly unconvincing except as a challenge to modeling. My point is that we should have a careful look at the managerial and regulatory incentives of intermediaries to get a better understanding of financial markets. A case in point is the October 19, 1987 stock market crash. Some observers (e.g. Amihud et al., 1989) have argued that the lack of liquidity prevented arbitrageurs to step in quickly and stop the rapid price fall; this argument, if correct, has deep implications for the regulation of exchange members and markets. Similarly, the role of the Fed's statement that it stood ready to provide liquidity and especially of the large New York clearing banks pressured by the Fed to lend to the securities firms and clearing-houses was cited as a crucial factor in averting a disaster (Bernanke, 1990). More generally an analysis of the two key determinants of 'institutional' liquidity trading, namely managerial incentive schemes and regulatory requirements (such as margin calls, overdraft rules, and solvency regulation), as well as bank lending and global liquidity will provide a better understanding of the microstructure of financial markets.

Financial intermediation is also of interest to macroeconomists. In the very short term, the organization of the payment system and of the interbank and monetary markets affects the conduct of *monetary and exchange rate* policies. In the short and medium term, banks' capital shortage or a strengthening of regulatory requirements can lead to a contraction of the real sector through a credit crunch, as well as to a partial substitution of bank loans by trade credit and sometimes by commercial-paper issuance. A credit crunch is most likely to affect those small and medium enterprises who, by lack of reputation (Diamond, 1991) or capital (Hoshi et al., 1993) have little access to bond markets.[3] Last, in the long run, banks are sometimes touted by economists and the media for playing a key role in development and growth (with Germany and Japan as illustrations) and other times been looked at as a reflection of the backwardness of an economy's financial markets.[4]

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[2] Because they want to buy a house; because their children go to college; or because they are unemployed, sick or die.

[3] See Wojnilower (1980) for an historical account of post-World War II credit crunches in the US and Bernanke and Lown (1991) for a study of the 1990 US recession.

[4] See Hellwig (1991) for a discussion of these views.

3. What is special about banks?

From now on we will focus on banks among financial intermediaries in order not to burden the exposition with distinctions and caveats. The reader should, however, bear in mind that a number of arguments can be directly transposed to other financial intermediaries.

The liability side of the balance sheet of a bank is, as in any firm, made up of debt (in this case, retail and wholesale deposits, which are senior, and subordinated debt) and equity. Roughly, its assets are composed of interbank loans, loans to government and government securities, loans to consumers and industry, participations, and a bit of physical capital. Off-balance activities (which, mainly for the biggest banks, have grown tremendously in the recent years) include bank acceptances, contingent loans and lines of credit, and exchange and interest rate swaps and options.

While there are many similarities between banks and nonfinancial companies, which we will later exploit, there are also a few interrelated *differences*. First, the debt of the banking sector is held by small depositors to a much larger extent than that of the nonfinancial sector.[5] Second, banks finance most of their investment externally, while nonfinancial companies finance about two thirds of theirs from retained earnings (Mayer, 1988). Because the issuance of shares represents a small fraction of financing in both cases, the debt–equity ratios differ much between the two sectors: for instance in the US in 1985 it was about 2 for all industries, 11 for commercial banks and 28 for savings banks. While stark differences in asset composition imply that one should not make too much of this comparison, these numbers still point at a potential fragility of the banking sector to shocks. Third, unlike the debt of nonfinancial firms, much of the banks' debt is insured, either explicitly (most of retail deposits) or implicitly (rest of retail deposits and often wholesale deposits as well). Fourth, the solvency of banks is key to a smooth functioning of the payment system. Fifth, although it is no less competitive than many unregulated industries, banking is heavily regulated.

Concerning this last difference, one might argue that the real point of departure is that the supervision is public rather than private. Indeed, the public regulation of banks' capital adequacy and risk taking offers some similarities with a bank or debtholders imposing convenants on debt issuance, net worth and risk taking by a nonfinancial borrower; or with a private clearing-house monitoring positions and collateral of its members.[6] The analogy does not stop here. A clearing-house acts as a delegated monitor for the members who find it too costly to supervise and constrain

[5] This fact is being investigated in a general equilibrium model in joint work with Bengt Holmström.

[6] See Gorton (1985) for more on the second analogy.

each other's positions and to coordinate the negotiation of credit lines to a member on a continuous basis. Similarly, a bank or a venture capitalist may act as a certifier for other lenders.[7] In both cases the monitor puts at stake both its own money and the cofinanciers' (through loss-sharing rules in the case of a clearing-house). Similarly, the government as regulator commits its own money (through the deposit insurance scheme) and that of uninsured creditors and equityholders. So, there is nothing unusual in the designation of a representative of depositors, all the more that, in the case of banking, investors are really very small and lack sophistication. So, the real specificity of banking in this respect seems to be that the regulator is usually public.

Last, it is often suggested that a main motivation for regulation is to avert 'systemic risk'. This may mean several things. First, regulation may reduce the probability of occurrence of the externality caused by a bank's failure on many other parties: local communities, uninsured creditors (including banks holding overnight loans[8] or a bilateral intraday surplus, banks using the bank as a correspondent bank and holding a positive balance at it) or borrowers who have contracted for or will shortly need lines of credit. On the other hand, the bankruptcy of General Motors could also impose distress on many other parties (suppliers,[9] local communities, dealers, consumers who have ordered cars, creditors, etc.) and yet GM is not regulated.

The second concept of systemic risk is that the failure of a bank would more indirectly affect other banks through some informational effect. One possibility is that depositors learn that banks with similar balance sheets might also fail. This effect is certainly most potent for small depositors and can be considerably alleviated through deposit insurance. The other type of inference, certainly more relevant for large depositors, is that the central bank is less willing to rescue failing banks than was previously thought. Such an inference may well result in a run in the wholesale market. One difficulty with the argument that systemic risk calls for public regulation, though, is that the government could rescue unregulated as well as regulated banks; indeed, the US government did rescue even Chrysler, Lockheed, and New York City.[10] While it may be the case that the government can more easily

[7] Sometimes with disastrous outcomes. A well-known case is that of Penn Square, a US bank which failed in 1982 and had sold a large number of its loans to other banks which had not checked their quality.

[8] 66 banks had uninsured deposits at Continental Illinois greater than their net worth when that bank failed in 1984.

[9] It is estimated in France that 20% of failures of French nonfinancial firms are linked with the failure of one of their customers (Conseil National du Crédit, 1993, p. 12).

[10] Within the financial sector, rescues are not limited to banks. In the US, the Pension Benefit Guaranty Corporation often makes good for shortfalls (due to, say, skimping on contributions by firms) in the pension funds. Another case in point is the 1989 establishment by the UK government of a compensation fund to meet up £150 million out of a total of £180 million in claims when the investment management firm Barlow Clowes failed.

rescue a regulated firm (or has more incentives to, say in order to cover up poor monitoring), a more careful analysis of the desirability of regulation on such grounds is called for.[11]

4. Banking regulation in a nutshell

We will not review all features of the 1988 international (G-10) Basel accords. Rather we emphasize capital adequacy requirements. Banks must maintain a capital ratio of at least 8% (unless their home country specifies a more stringent rule). A bank's capital ratio or *Cooke ratio* is defined as the ratio of equity to the total risk-weighted (on- and off-balance) assets. Weights for assets on the balance sheet depend on the institutional nature of the borrower. For example, the weight is equal to 0 for a Treasury security, meaning that the bank can finance such a security through deposits without adding any equity. There are three other possible weights, all meant to reflect credit risk: 0.2 (e.g., for interbank loans or for loans to local governments), 0.5 (e.g., for mortgages), and 1 (e.g., for industrial and commercial loans and for securities). So for a $1 loan, the bank needs to add 8 cents in equity if the borrower is a nonfinancial firm but only 1.6 cents if the borrower is another bank. Weights for off-balance assets depend on the nature of the borrower and on the type of the transaction.

In case the bank does not meet the minimal capital requirement, the *regulator* is meant to act in a fairly nondiscretionary fashion. First, the bank should be asked to recapitalize to the minimum level. Second, if recapitalization does not occur, the regulator must either sell or liquidate the bank, depending on which is cheaper. [Here there is a fair amount of discretion in evaluating the cost of liquidation. For example, there is some concern that the government might be tempted to sell the bank, with the concomitant infusion of taxpayer money in the form of recapitalization, acquisition of bad loans at historical value or other means, by arguing that liquidation would have a systemic effect on the bank's customers and on other banks].

The Cooke ratio attempts at summarizing complex information on on- and off-balance sheet activities of a bank in a single-dimensional variable. It has some well-known *drawbacks* that are the topic of ongoing reflection. First there is almost no measure of *portfolio risk*.[12] The Cooke ratio therefore does not reflect the positive or negative correlation of the assets.

[11] 'Systemic risk' actually has a third connotation relative to the functioning of the payment system and refers to an unwinding in a net settlement system or a gridlock in a gross settlement system.

[12] Except for the fact that banks cannot have any single large risk in excess of 20% of their capital and a sum of large risks exceeding 800% of their capital.

Similarly it does not measure the bank's exposure to interest rate risk. Interest rate shocks started the Savings and Loans' crisis in the US. S&Ls had invested in long-term, fixed-nominal-rate mortgages, while their debt was short-term. This created an imbalance when interest rates went up considerably in the late seventies and early eighties. Banks have means of reducing their exposure to interest rate risk, namely maturity matching, indexing, entering interest rate swaps, and trading in options or futures markets. Yet, a swap meant to insure them against interest rate (or exchange rate, for that matter) fluctuations adds a new operation and lowers the Cooke ratio instead of raising it.

Another well-known drawback of Cooke ratios is that they are based on historical cost accounting, so the assets are unlikely to reflect their *true market value*. To be certain, some market value accounting shows up in the Cooke ratio through the auditors' and regulators' insistence on provisioning for foreseeable losses; it is also the object of some reporting requirements under some regulations.[13] But market value accounting still has little bite on actual regulation. Yet, economists usually come up fairly strongly in its favor (while recognizing that, in the absence of auctions of assets, its application is often subjective and therefore prone to manipulations). We will discuss in Section 8 whether this position is warranted.

Third, Cooke ratios, because they are based on balance sheet information (together with regular updating reports by the bank), are *slow* to adjust to new information. Private and governmental ratings help reduce this lag and reflect market value information.

Last, the Cooke ratio is meant to measure bank solvency, and says little about the bank's potential exposure to short-term, *liquidity* problems. Of course, in a perfect information world, a solvent bank would never have any trouble raising funds to cover temporary imbalances between its payments and receipts. It could borrow, as it does in practice, from other banks or, if there is more time, from depositors (by increasing deposits). Things look different though if its solvency is in question, unless either interbank loans are explictly or implicitly insured (in which case other banks are willing to lend to an illiquid bank) or the bank can collect insured deposits sufficiently fast. While the Basel agreements rightly treat solvency as the central issue, it should be remembered that liquidity problems may matter in practice, especially if one attempts to move away from full deposit insurance as is often recommended by economists, and that perhaps they should matter anyway (regulators may detect a solvency problem through the bank's liquidity problems in the same way banks often get an advance signal of the

[13] The Federal Deposit Insurance Corporation Improvement Act of 1991 requires US banks to disclose estimated fair market values.

potential failure of their customer through an increase in short-term borrowing).

5. Optimal governance structure for banks[14]

Unlike the regulation of telecommunications, electricity or local services, banking regulation does not seem motivated by the existence of large economies of scale resulting in a monopoly position and the concomitant price and quality regulation. In our view, banking regulation stems primarily (although not exclusively) from the desire to protect uninformed, incompetent and free-riding depositors.[15] Our approach consists in first viewing a bank as an ordinary firm and second introducing this 'market failure'.

So let us step back and ask ourselves how one usually tries to control moral hazard in firms. Firm managers are given formal incentive schemes (bonuses, stock options), but are also subject to less formal incentives in the form of potential outside involvement in management. For example, shareholders, in particular through the board of directors, can put the firm under the control of a holding company, ask the manager to reverse a decision, divest a division, cancel an R&D project, forgo some perks, or leave. Similarly, and perhaps more importantly as we will see, debtholders, in particular a main bank, can force the firm to take such decisions when they could induce failure by refusing to extend a credit line or reschedule their claims. We view external pressure of interference as a main component of managerial incentive schemes given the obvious limitations of formal incentives.

It is tautological to say that managers dislike interference in that they prefer being left doing whatever they want to do. Therefore managerial discipline is best provided by promising a low level of interference in case of good performance and a high level of interference in case of a mediocre one.

Because external intervention cannot be precisely specified, outsiders upon whom control is conferred must be given incentives to intervene in the proper way. In a sense, we have a 'double moral hazard problem' for insiders and outsiders. The outsiders' incentive schemes are provided by the return streams attached to their securities. We therefore predict that the securities' returns streams and control rights should follow a systematic pattern. And, indeed, equityholders, with their convex return structure, typically have control in good times while debtholders, with their concave return structure, have de facto control in bad times.

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[14] The ideas in this section were first explored in Dewatripont and Tirole (1993b).

[15] Another motivation is the functioning of the payment system. We will ignore this motivation for conciseness, and also because it is more specific to banks. We should note, however, that it is related to the solvency focus of this paper.

To accord with the forms of interference discussed above and also to be able to match this observed correlation between return streams and control rights, it is natural to assume that interference leads to a decrease in risk. Then, claimholders with a concave return structure (debtholders) are more prone to interfere (are tougher) than those with a convex return structure (shareholders). Combining this with the general point that interference should follow a mediocre performance, we thus conclude that *control should shift from soft claimholders (equityholders) to tough ones (debtholders) in case of mediocre performance.*

In the two-period model in Dewatripont and Tirole (1993a), a low first-period profit, or (equivalently in this model) the nonreimbursement of maturing debt in that period allows debtholders to take control or at least to threaten to take control in order to impose their demands. But here is the twist: In the case of a nonfinancial company, a main bank or a few large debtholders can easily exert such control rights.[16] In the case of a bank, debtholders are mostly small, uninformed, and free-riding. This suggests that they should be *represented.* Although they are usually represented by government agencies, one may also consider alternative 'regulators' such as a banking club, a rating agency, a private deposit insurance company or a large debtholder. We refer to Dewatripont and Tirole (1993a) for a detailed discussion of the costs and benefits of private banking regulation.

6. Net worth adjustments as a response to perverse incentives

The optimal interference policy does not only consist in allocating control between equityholders and debtholders. The incentives of the controlling claimholders must further be adjusted within each control region through, say, net worth adjustments (recapitalization, dividend distribution).

To see this, let us sketch the two-period model alluded to above and which will be referred to later on. The bank lends short-term and long-term to industry and faces in period 1 managerial moral hazard in its management of both types of loans. The bank's first-period profit v (net of first-period deposit withdrawals) is realized; more generally, v could stand for any objective information that would be recorded in the bank's Cooke ratio at the end of period 1. The second-period profit η is not yet realized, although a signal about the prospects of the bank or its environment might accrue at this stage. Let the bank's period-two obligation to depositors be equal to D,

[16] Bondholders on the other hand are usually quite dispersed, but only firms which are well capitalized or reputable and therefore less likely to enter financial straits have access to the bond market anyway.

and let $\bar{\eta}$ denote the historical cost (value of the principal) of the long-term assets. The balance sheet at the end of period 1 is thus:

Assets	Liabilities
v	D
$\bar{\eta}$	E

where net worth or equity, E, is as usual defined as a residual. Assume that v is reinvested in a safe asset, say a Treasury Bond, at the market rate of interest of zero.[17] According to the international agreements, the safe asset has weight 0 while the industrial loans $\bar{\eta}$ carry full weight. The Cooke ratio at the end of period 1 is then

$$r=\frac{v+\bar{\eta}-D}{\bar{\eta}}.$$

A straightforward reinterpretation of the allocation of control to shareholders in good times ($v \geqq v^{\min}$ for some $v^{\min}$) and to debtholders in bad times ($v<v^{\min}$) is in terms of Cooke ratios: Letting $r^{\min} \equiv (v^{\min}+\bar{\eta}-D)/\bar{\eta}$, shareholders keep control if and only if

$$r \geqq r^{\min}.$$

We are now in a position to discuss net worth adjustment in each control region. For conciseness, let us focus on shareholder control (the conclusions are the same for debtholder control). Suppose that the bank's performance v deteriorates. Net debt $D-v$ increases, so the bank is less capitalized, in the sense of a lower Cooke ratio. Shareholders are then more tempted not to interfere to reduce risk (formally the set of signals about second-period prospects that lead to risk taking expands). This is easily understood: For example, if net debt is large, the shareholders can make money only if they 'gamble for resurrection'. And indeed the evidence shows that the S&Ls which took the most risk were the zombies. We thus conclude that poor performance is followed by reduced interference, yielding a clearly perverse incentive for managers. A recapitalization compensating the deterioration of the balance sheet counters this perverse evolution. Conversely, in case of brilliant performance shareholders want to play conservatively in order not to jeopardize their newly acquired assets; a dividend distribution then helps reduce the level of interference.

Comparison with the Basel agreements. Under international regulations,

[17] See Dewatripont and Tirole (1993a) for the case of reinvestment in risky assets.

equity does keep control for a high enough solvency ratio as suggested by the theory. In contrast, debtholders, or rather their representative (the regulator) does not quite get control in case of low solvency. Running the bank in the best interest of depositors (or the deposit insurance) is not an allowed option. Rather, if recapitalization does not occur, the regulator is meant to liquidate or sell the bank. The practice thus confirms theory in that a tougher stance is taken in case of low solvency. One can in particular check that the lower the solvency ratio, the less likely shareholders are to recapitalize and the tougher is the discipline. Yet practice involves a less discretionary debt control than given by the theory. This discrepancy can be viewed as reflecting the political economy concerns studied in Section 10.

7. Should capital adequacy requirements depend on the business cycle?

International regulations state that a bank's Cooke ratio must exceed 8% at all times. Many have criticized this rule on the grounds that it is harder for a bank to reach 8% in a banking recession than in a boom. As a matter of fact, regulators have often been more lenient during banking recessions. For example, in the early 80s, when the US S&Ls were badly hurt by interest rate shocks, the regulators lowered solvency standards substantially first by lowering the floor from 5% to 3% and second by adopting new, laxist accounting procedures; they could accordingly declare most S&Ls 'solvent'. Regulators defended their policy precisely on the grounds that solvency requirements should be indexed on the cycle.

Taking an incentive approach to banking sheds light on this debate between absolute and relative ratios. Informativeness theory (Holmström, 1979; Shavell, 1979) implies that banks should be insulated from uncertainty that they do not control. For example, suppose that bank i's verifiable variable entering the Cooke ratio, v_i (in the notation of Section 6) is the sum of an idiosyncratic risk v_i^{I} and of an aggregate risk v^{A} (real estate, interest rate, loans to LDCs, etc.), common to all banks. Theory recommends that bank management not be affected by v^{A}. All this is standard. What is less well understood is that this reasoning does not call for a relative ratio rule because the incentives of outsiders in control must be accounted for (the double moral hazard problem for insiders and outsiders is the key to most of our discussions).

To understand this, suppose that the minimum solvency ratio is equal to 8% in the absence of aggregate shock and that a macroeconomic downturn lowers the solvency ratio of all banks by 6%. A bank that would have normally reached a ratio of 8.5% has a ratio of 2.5%. To leave control to shareholders, as is appropriate, the solvency requirement should be lowered to 2%. However, shareholders do not behave in the same way when the real solvency is 2.5% and 8.5%. Indeed following the downturn, they want to

gamble for resurrection. To complement the relative ratio rule (which preserves the proper allocation of control), one must also recapitalize the bank by an amount (here 6%) contingent on the average profitability of banks with a similar balance sheet composition to account for the altered incentives. [Of course, a recapitalization may not be easy, all the more as many other banks in a downturn are also trying to recapitalize. One may then consider alternative instruments such as pro-cyclical deposit insurance or any other government policy that would have the effect of helping banks in a downturn and tax them in a boom.]

Note last that the Basel accords insulate bank managers from aggregate risk as long as shareholders have an incentive to recapitalize. They are, however, much too strict in case of a large adverse macroeconomic shock because they force liquidation or sale in circumstances that are out of the realm of managerial control.

8. Market value or historical cost accounting?

One can apply the same informativeness reasoning to shed light on another important policy debate: Should one record a bank's assets at their historical cost (as has always been done) or at their market value (assuming that this value can be measured)?

Returning to our two-period framework, assume now that the bank's second-period profits is $\eta+\varepsilon$, where η is not yet realized in period 1 and ε is some macroeconomic stock that is revealed in period 1. For example, ε reflects news on the real estate market, the interest rate or the value of loans to LDCs. Macroeconomic shocks are of particular interest because they can often be measured more objectively than idiosyncratic shocks, and therefore give the best chance to market value accounting. (Idiosyncratic shocks are more likely to be measured objectively at the time of a sale of the assets by the bank. We refer to Dewatripont and Tirole (1993a) for a formal analysis of securitization.)

The balance sheet and the solvency ratio at the end of period 1 are, for the two accounting methods:

Market value accounting	
$v+\varepsilon$	D
$\bar{\eta}$	E

$$r=\frac{v+\varepsilon+\bar{\eta}-D}{\bar{\eta}}$$

Historical cost accounting	
v	D
$\bar{\eta}$	E

$$r=\frac{v+\bar{\eta}-D}{\bar{\eta}}$$

We immediately observe that market value accounting, but not historical

cost accounting, implies an excessively volatile allocation of control under a capital adequacy requirement. On the other hand, historical cost accounting does not adjust the shareholders' incentives, who again are induced to gamble for resurrection in case of adverse shock. Historical cost accounting, like the relative ratio rule, insulates the allocation of control from exogenous noise but takes no account of the effect of this noise on the shareholders' incentives. Market value accounting, like the absolute ratio rule, improperly allocates control. The policy implications, including the need for a median policy, follow the lines of Section 7.

9. Public regulation

As mentioned earlier, we will by lack of space, focus our attention on government regulation. In fact we do find some appeal to some form of mix of public and private regulation; we will touch briefly on the issue in Section 11 but, by and large, refer the reader to Dewatripont and Tirole (1993a).

Adopting the viewpoint that the government represents depositors has simple but powerful implications: The government ought to intervene in case of insufficient solvency with the aim of maximizing depositors' welfare.

One way of thinking about this behavior is to envision full public deposit insurance *combined with control rights for the deposit insurance fund.* Full deposit insurance implies that the government receives the return stream of depositors (up to a constant, namely the nominal value of deposits). It then becomes natural to let the government also inherit the control rights attached to the corresponding claims. An agency attempting to minimize the expected loss of the deposit insurance fund and on whom the usual control rights associated with debt are conferred would act as a perfect representative of depositors.

Before tackling the question of whether such a pattern of regulation is feasible or even desirable, we should also point out that this view gives a biased objective to the regulatory agency: like a finance ministry imposing fiscal rigor on 'spending ministries', the regulatory agency in charge of prudential policy is not meant to internalize social welfare, but rather to be more narrowly concerned by the financial health of the deposit insurance fund. *This narrow objective is precisely what guarantees bank discipline, in the same way the finance ministry is meant to impose rigor on the public sector and debtholder control effectively constrains the management of nonfinancial firms.*[18] Indeed, the internalization of social welfare as a whole by the regulator can be shown to lead to excessively soft behavior, as shareholders,

[18] There is actually a formal analogy between multiministry oversight of projects or utilities, the financial structure of firms, and banking regulation. See Tirole (1993).

and of course management itself, are less prone than debtholders to interfere with the will of managers. (And, needless to say, regulators are even softer when they are captured by the industry in that they put more weight on shareholders and management than on depositors.)

10. The political economy of banking regulation

There are really two kinds of criticisms that can be addressed to the stance taken in the previous section. The first (desirability issue) is that the partisan objective described there results from an analysis too narrowly focused on banking supervision. The second (feasibility issue) is that it may be hard to give the regulatory agency the proper incentives to accomplish its mission.

10.1. What should banking supervisors do?

Central banks have multiple missions: (1) monetary and exchange rate policy, (2) banking supervision (in countries where it is located at the central bank rather than at the Treasury), (3) regulation of the payment system, (4) agent for the Treasury, as well as some other missions, for instance (5) operation of a clearing system (for most central banks). Naturally they must arbitrate among these different goals. For instance, a strong-currency objective may jeopardize bank solvency by jacking up interest rates (arbitrage between (1) and (2)). Another arbitrage might stem from the fact that central bank decisions (e.g., with respect to (1) and (2)) impact on the Treasury's welfare (mission (4)) through various channels: e.g., demand for Treasury securities affected by interest rates or by the definition of acceptable collateral for approved overdrafts and loans; externality of supervisory policy on a deposit insurance fund located at the Treasury. The central bank may also have to arbitrate between the operation of a public clearing system and the regulation of the system's private competitors in the payment system (missions (3) and (5)). Last, and without any attempt at exhaustivity,[19] we should note that supervision and operations ((2) and (3)) in countries like France and the US are separated by Chinese walls, with no mutual access to information except in exceptional circumstances.

There is nothing wrong per se in weighing several socially desirable objectives. Indeed, until now, I have been careful to use the word 'arbitrage'

[19] Some arbitrages are country specific. For example, a major issue in Central and Eastern Europe is that the central bank (under political pressure) encourages state owned banks to direct most of their loans to failing state owned enterprises. It also substitutes for taxing authorities by imposing high unremunerated reserve requirements in order to raise revenue.

rather than the phrase 'conflict of interest' more commonly used in this context.

10.2. Can proper incentives be provided?

The issue of incentives in government is a broad one and I refer to my 1993 paper for a fuller treatment (itself based on ongoing work with Mathias Dewatripont). There are two reasons why it is not straightforward to provide *formal* incentives to a central bank. First, while some dimensions of a central bank's performance are easily measurable (e.g., the solvency of the deposit insurance fund), others are harder to pin down (how does one measure the efficiency of a payment system?). Furthermore, as has been noted in the incentive literature (see, e.g., Holmström and Milgrom (1991) for a treatment and an extensive list of references), one cannot simply give powerful incentives to an agent on the measurable dimensions of her performance and no incentives on the nonmeasurable ones, because this induces a serious misallocation of resources toward the dimensions that are the subject of formal incentives.

So, like most government agencies, central banks are governed by *informal* incentives rather than formal ones. There are two main kinds of informal incentives (besides public service mindedness, and the ego): supervision by the political system (legislative, executive, or even the judiciary) and career concerns. As is well known, political supervision has the drawback of creating a likely bias in favor of those policy dimensions that concern powerful interest groups.[20] In the background here lurks the standard debate about the allocation of control between the central bank and the Treasury, which is more accountable but also more subject to interest group pressure. There is no point dwelling on this issue.

The second classic informal incentive is career concerns. Civil servants care about being promoted and receiving job offers in the public and private sectors, and politicians care about being reelected. An analysis of multitask career concerns shows that composite missions that reflect the several goals of social optimization may not fit with the officials' self interest. That is, *the official may pursue a single mission even if given a composite one.* Consider the following illustration: Suppose that the official may have high or low ability (and, for simplicity, does not know which prevails). The official has two tasks, 1 and 2, and may reach a poor or a good performance in either task. Assume further that an official with a low ability obtains a poor outcome in tasks 1 and 2 regardless of his allocation of effort. What then matters to the

[20] The power of an interest group reflects not only its stake and its level of organization, but also the type of policy intervention (see Laffont and Tirole, 1993, Chs. 11–16).

official is to demonstrate high ability when this is indeed the case. It is then optimal for the official to 'put all his eggs in the same basket', that is to allocate all his attention to a single task; for, there is no extra gain having a high performance in both tasks; it is far more important to make sure that at least one task is successful.[21]

Behavior may actually be more complex than this. For instance, multitask career concerns may give rise to 'fuzzy mission equilibria', in which an official given a composite mission actually follows a single mission, yet this mission is unknown to the labor market. For motivation (primarily based on Wilson, 1989) as well as a formal treatment, see Tirole (1993). Overall, the incentives provided by career concerns in a multitask framework are likely to be even more removed from optimal incentives than in a single task framework.

We conclude this section with two related points on career concerns. First, we emphasized the allocation of effort or resources among the various missions of the agency. Yet a different concern arises when the implementation of one mission reveals information about the performance in another mission. A case in point is 'regulatory cover up', in which bank supervisors refrain from closing banks they know are insolvent by fear that a failure would be interpreted as resulting from loose monitoring in the past. Regulators often prefer to ignore the solvency problem and either pass the buck to the next administration or engage in regulatory gambling, that is hope that a positive shock will recapitalize the bank.[22] Second, another motivation for splitting tasks among agencies and giving each single and therefore biased mission is the process of collecting information and arguing a case on its basis. In the same way it is natural to have an attorney and a prosecutor in a trial, or representatives of different districts in a parliament, or else ministries with different objectives in government, it may well be the case that having different groups in a central bank, each in charge of making a case for its own cause, may be a fine method for a central bank governor or a minister of finance to obtain information that is relevant for decision-making (see Tirole (1993) for more details).

11. Too big to fail?

As we have seen, quesions about government incentives surface in many areas of banking regulation. A particularly controversial behavior is the

[21] In contrast, if high ability were demonstrated primarily by being successful in both tasks, then composite mission equilibria would exist.

[22] On this, see Dewatripont and Tirole (1993a), and especially Boot and Thakor (1993), Gale and Vives (1993) and Seabright (1993).

pervasive policy of rescuing large banks. Governments often balk at liquidating the bank (that is, using the 'payoff' method) and instead provide cash to attract a buyer (purchase and assumption), or inject capital and take shares in the bank, or else simply absorb some of the bank's bad loans. Before undertaking those rescues, the regulator may have exerted forbearance by not enforcing capital requirements. It is customary – and correct – to assert that 'too big to fail' is one of the most serious issues in banking.

Consider the wholesale market. The rationale for the existence of interbank loans, relative to a purely centralized, government operated market for liquidity, is that banks can more easily lend to each other on the basis of fine (subjective) information about their solvency. If the government (for political economy reasons) is constrained to lend solely on the basis of more objective information (Cooke ratios, independent ratings), direct interbank lending offers a further boost for intrinsically healthy banks and a further constraint on weak ones. Yet interbank loans that are implicitly insured by the government do not reflect fine information and therefore do not discriminate among banks. The benefits of a decentralized wholesale market are then unclear, all the more that the central bank may lose some control over total bank borrowing in the short term.

We therefore should think about ways of protecting the government from the fait accompli of a large bank about to fail and jeopardizing a number of other financial institutions. This paper does not supply a solution to this problem but can point at a few relevant considerations. One extreme policy would be to forgo decentralized interbank lending (both intraday and overnight) by letting the central bank be a counterparty and guarantee each transaction and possibly constrain total net borrowing of banks. This centralized framework dominates a decentralized one in which interbank loans are implicitly insured: Systemic risk is averted in both cases, but the central bank can more easily monitor and constrain total borrowing by each bank. The central bank is then the bank of banks in the strongest sense.

However more decentralized schemes, that yet are not as decentralized as an unconstrained interbank market, may be preferable. First, the regulator might limit each bank's exposure toward any other bank. For instance, the ratio of bank i's net lending to bank j over bank i's net worth might be required to be at any time lower than a fraction that depends on bank j's Cooke ratio or/and public and private ratings. The idea would be to make it likely that bank j's failure would not trigger bank i's, and therefore to disengage the central bank. The constraint on bilateral net lending would be more stringent when the borrowing is less healthy and therefore more likely to fail.

Second, and in the same spirit, one could consider coinsurance on the interbank market. Currently the lending bank formally bears 100% of the risk of default of an interbank loan; in practice it bears close to 0% if the

borrower is big. One might formalize some intermediate degree of risk-sharing. Insurance would then have an explicit deductible; this deductible would be the relevant measure of net lending by bank i to bank j in the definition of the bilateral net lending cap above. The insurer might be public or private, or a mixture of the two. A private insurer would of course be subject to stringent capital requirements since its risks would be fairly correlated (banks tend to fail in a downturn of economic activity). In a sense, this coinsurance would mimic institutions already existing in other settings. For instance, one tier down, suppliers of goods and services can obtain insurance against default of a customer from a credit insurance company. Credit insurance companies act as delegated monitors by developing their own rating of customers and helping suppliers intervene. In France, the credit insurance companies (which insured F700 billion in 1991) usually bear 60 to 75% of the risk.[23] An alternative and common arrangement allowing suppliers to obtain insurance against customer default consists in transforming the debt between the two nonfinancial parties into a debt between the supplier's and the customer's banks. This involves a 'double delegated monitoring', with the customer's bank monitoring the customer and the supplier's bank monitoring the customer's bank. Last, an analogy with coinsurance by the government is supplied by the US system of federal matching of state grants for programs involving substantial interstate externalities (e.g., in education and welfare programs).

12. Conclusion

This lecture develops a simple, yet rich framework for the study of banking regulation. Besides being consistent with common banking behavior and with regulatory practice, this conceptual framework generates new ideas about policy questions such as relative Cooke ratios and market value accounting. Yet this lecture is incomplete in many respects. The previous section did not do justice to the issues of liquidity, interbank loans and private regulation. And we did not touch on major topics such as universal vs restricted banking, bank vs nonbank competition, and international regulation. We hope that future research will provide conceptual insights on these issues.

[23] See Conseil National du Credit (1993).

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