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Regulatory Capture in Banking

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Abstract

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Banks will want to influence the bank regulator to favor their interests, and they typically have the means to do so. It is shown that such “regulatory capture” in banking does not imply ineffectual regulation; a “captured” regulator may impose very tight, costly prudential requirements to reduce negative spillovers of risk-taking by weaker banks. In these circumstances, differences in the regulatory regime across jurisdictions may persist because each adapts its regulations to suit its dominant incumbent institutions.

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I. INTRODUCTION

Banking is one of the most regulated and supervised of economic sectors. Even in less developed countries, banks are subject to numerous regulations and an elaborate system of on-site and off-site supervision. Major banks typically have supervisors working on their premises at all times. Elaborate regulations are typically imposed also on other components of the financial system. The direct costs of complying with regulations can constitute a significant share of financial institutions' operating costs. This system of controls strongly influences the institutions' behavior and performance, and therefore the supply of financing to the economy and the incentives to save. The regulatory framework also affects the vulnerability of the financial system to crisis and thus the stability of the entire economy. In the light of the importance of the financial regulation and supervision regime, it is worthwhile to understand how such a regime is likely to develop, and how best this development can be directed to promote the creation of a financial system that is sound, efficient, and conducive to overall economic growth.

One element of this understanding must be a recognition of the possibility of regulatory capture, that is, the possibility that the regulated institutions exercise excessive influence on the regulator. A captured regulator acts primarily in the interests of the regulatees, rather than in accordance with their putative mandate to promote the common good.

The consequences of capture of the financial sector regulator may differ from those of the capture of a regulator of a nonfinancial sector, just as the publicly-acknowledged reasons for regulating the financial sector differ from those advanced for regulating other sectors such as utilities. Finance and in particular banking is necessarily characterized by asymmetric information between banks and their clients, and by systemic effects. Moreover, risk is an inherent feature of the industry. Confidence effects among banks and between banks and their creditors create various forms of externality. Other externalities arise because of competition, but the competitive behavior of banks will vary depending upon their financial condition—sound banks may have lower funding costs, and weak banks may compete more aggressively. Furthermore, the prevalence of risk implies also that banks are heterogeneous or become heterogeneous as disturbances occur. This paper looks at how regulatory capture might work in the banking industry, taking these characteristics into account.

It will be shown that bank regulation may be especially susceptible to capture, and there is some evidence that capture has significantly influenced regulatory and supervisory decisions affecting banks and other financial institutions (Section II). A model will be developed to illustrate why banks may welcome regulation, and why some banks may favor stricter regulation (specifically, capitalization requirements) than is socially optimal (Section III). The desire for strict regulation does not stem from the advantage incumbents might gain from restricted competition, but from the risk shifting and moral hazard phenomena that are endemic in financial systems. The regulations favored by banks will be contingent on the condition of the banks. For example, a large shock to the system may create a discrete shift in banks' preferences towards loose regulations, even if they previously were adamant in pushing for tight regulations. Furthermore, it will be shown that, when jurisdictions compete with one another to attract financial institutions, the regulatory regimes need not converge,

still less converge on a low level of regulation (Section IV). Rather, institutions with common interests may congregate in one jurisdiction, which may adapt its regulatory regime to suit those interests and differentiate itself from other jurisdictions even if that involves the imposition of stringent regulatory requirements.

II. SUSCEPTIBILITY OF BANKING REGULATION TO CAPTURE

The seminal article by Stigler (1971) suggests that regulators are commonly subject to intense and effective pressure from regulated firms to modify regulations and their implementation to suit the interests of the latter (Laffont and Tirole, 1993, provide a useful overview). The regulated firms may exercise pressure at the political level, for example, by supplying politicians with one-sided evidence supporting their positions and attempting to gain their allegiance through campaign contributions. The regulated firms may exercise pressure and influence also at the level of the regulatory agency, for example, by implicitly offering agency staff lucrative employment opportunities in exchange for being cooperative, and generally inducing the regulators to identify with the regulated industry. Other interest groups may adopt similar tactics. As emphasized in Laffont and Tirole (1991) and Laffont (1999), regulatory capture is likely to be more effective when one interest group is highly concentrated and organized and has much at stake, and when the regulations are technically complex and asymmetric information is pervasive, so that outside verification is difficult. Most of the literature on regulatory capture is framed in terms of a regulated utility. Classic instances include a utility that lobbies for higher prices, a polluter that lobbies for higher emission limits, or a monopolist that lobbies for the retention of barriers to entry.

There is no reason to suppose that financial sector regulation is immune from capture, and features of financial markets may make the sector especially prone to it. Financial institutions' vital interests are at stake in the formulation and implementation of regulations. The financial sector often contains a number of very large institutions, or is organized into powerful banking associations, which can afford lobbying efforts and well-prepared participation in public debate on regulatory measures. In contrast, other concerned interest groups, such as deposit holders, typically have more diffuse membership. Financial institutions tend also to be well connected to the political establishment and thus to have access to channels of influence. In the United States, for example, they are among the largest contributors to political campaigns. Regional and local political leaders are represented on the boards of banks making up a large share of the German banking industry.

Bank supervisors and regulators may well identify with the sector under their purview and may pay undue regard to the interests of the regulated institutions. Typically, regulators consult with the industry before modifying regulations, and they may be subject to a legal requirement to do so. Bankers and supervisors are necessarily in close contact during on-site and off-site inspections. Hence, bankers will have many opportunities to present their views to the supervisor and regulator. The supervisors need the cooperation of banks to do their job effectively, for example, by being given access to documentation and data and by being kept up to date on new products and operations. Supervisory staff, including senior staff, are frequently attracted to work in the regulated institutions, which offer high salaries to those familiar with the functioning of the supervisory agency. Therefore, regulators may be reluctant to antagonize bank management. Moreover, the regulatory agency in many

countries has a more or less explicit mandate to promote the development of the national financial system and the promotion of its competitiveness against other financial centers.² Such an agency is committed to formulating regulations that are advantageous to its banks.

Even besides these organizational aspects, the complexity of banking regulations and certain features of banking facilitate regulatory capture by banks. First, the regulations are lengthy and intricate, with subtle interactions between different components (for example, between rules affecting participation in the payments system and liquidity requirements, or between the accounting for off-balance sheet items and capital requirements). Second, very specialized skills and a vast amount of data are necessary to conduct banking supervision. Third, the maintenance of confidentiality—of information on individual transactions, on each institution, and on the system as a whole—is a legitimate requirement. These factors make it very difficult for an outsider to verify whether regulation and supervision has been impartial, and even for the regulators involved to see whether they are acting in the long-term public interest.

Regulatory capture in banking has received some attention in the literature, and a certain amount of related evidence has accumulated:³

- Kane (1990) provides a comprehensive analysis of how U.S. savings and loan institutions successfully influenced the regulations applied to them and the resolution of the subsequent crisis. Both the regulatory agency and the U.S. Congress were subject to influence and both had conflicting incentives, as elaborated further in Kane (2001). While capture was not complete, managerial and bureaucratic interests, budget constraints, and shifting objectives contributed to what became a debacle.
- Certain past regulatory debates, for example, on restrictions on inter-regional branching and on deposit insurance in the United States, were dominated by conflicts between the interests of different sorts of banks and other financial institutions, with relatively little regard for the interests of others (Abrams and Settle, 1993; and Krozner and Strahan, 2000).
- Rosenbluth and Schaap (2003) present evidence to support their hypothesis that different electoral rules will affect the extent to which bank regulations favor producers over consumers of financial services.

² The Bank of England used to view the promotion of the City of London as one of its prime mandates. Much of the debate on harmonized regulations in the run up to the European Monetary Union consisted of defense of national financial industries by the respective central banks.

³ On a more anecdotal level, in the experience of the author, bankers tend to be very complimentary about the supervisory authorities. Such expressions of high regard may be politic, but may also represent a certain commonality of outlook and interests.

- The literature on the “franchise value” of banks touches upon the implications of regulatory capture: it is argued that banks have franchise value, that is, the value of the position as incumbent in an oligopolistic industry, and bank owners act to preserve franchise value (Boyd and De Nicoló, 2003). Hence, incumbent banks have an incentive to support entry barriers imposed by regulators such as tough licensing requirements.
- Current discussions on the Basel II capital accord, which have been organized around consultations with banks, also offers an arena for attempted regulatory capture. The regulations are complex and introduce significant scope for discretion by supervisors, and so regulatory capture in implementation may be feared (European Shadow Financial Regulatory Committee, 2003).
- The establishment of a prudential framework has progressed relatively quickly in transition countries, and has met with relatively little political opposition, while reform of the corporate sector and corporate sector regulation has often proven to be intractable.⁴ This phenomenon suggests that the financial institutions in those countries saw some advantage in being regulated.
- Some evidence indicates that capture may affect the regulation of the nonbank financial sector (Woodward, 1998) and related areas of regulation, such as accounting (Godfrey and Langfield-Smith, 2004).

III. A MODEL OF BANK REGULATION WITH MORAL HAZARD

A positive model of regulation specific to the banking sector needs to reflect the peculiar features of the industry that differ from those of most other regulated industries. Those features relate to the role of risk and asymmetric information, which create moral hazard and systemic effects. As the model presented here illustrates, regulatory capture under these conditions has distinctive implications.

Behavior of banks and depositors

Each bank can invest either in a risky asset with return r , or in a safe asset with fixed return s . The risky asset can be thought of as a portfolio of risky lending. The random variable r has support $[0, \infty]$ and a distribution function $f(r)$. Returns on different banks' risky investments are uncorrelated. The bank finances its investments from its capital K or from outside financing, called deposits D . The bank is a price taker in the market for deposits, which yield i ; i is independent of the composition of the bank's portfolio, which is assumed to be unobservable by depositors. It is also assumed that $E(r) > s > i$ and that $0 \leq L \leq D+K$ (so the bank can borrow neither the risk-free nor the risky asset).

⁴ One review notes that “positive efforts to ensure financial discipline and proper management in banks have not been matched in the real sector” (Siegelbaum and others, 2002).

If the risky investment yields a high return, the bank owners enjoy the profits and pay out i per unit of deposits. However, there is limited liability, so that if the risky investment yields such a low return that the bank suffers a loss, available funds are shared out among depositors. Expected bank net worth is

$$E(\Pi) = \int_{r^*}^{\infty} (rL + s(D + K - L) - iD) f(r) \quad (1)$$

where investment in the risky asset is L and r^* is the return on the risky investment that just bankrupts the bank:

$$r^* = s - \frac{D(s - i) + sK}{L}. \quad (2)$$

Note that $r^* < s$, and that $\partial r^* / \partial K < 0$, and so better capitalized banks break even at a lower returns on the risky investment.

The bank is risk neutral and chooses L to maximize expected net worth. However, differentiating (1) with respect to L yields

$$\frac{dE(\Pi)}{dL} = \int_{r^*}^{\infty} (r - s) f(r)$$

which is always positive. Hence, the bank invests fully in the risky asset.⁵ The reason is that the depositors bear the risk in the event of very bad outcomes, and therefore the bankers are subject to moral hazard.⁶

The banking sector as a whole is heterogeneous because some have more capital than others. Capital ranges over $[K, \bar{K}]$, and is distributed according to $g(K)$.

Consider now the depositors, who are risk-averse and have a utility function $U(\cdot)$, $U' > 0$, $U'' < 0$. It is assumed that each depositor can invest either entirely in bank deposits or entirely in a risk-free investment that yields s^D , $s^D < s$.⁷ This “either/or” assumption is convenient

⁵ It is useful to note that $\int_{r^*}^{\infty} r f(r) > \int_0^{\infty} r f(r) > s$. Also, because r^* is defined as the return that exhausts capital, the differential with respect to the end-points of the integral is necessarily equal to zero.

⁶ Given risk neutrality, all resources would be invested in the risky asset even if $E(r)$ were slightly less than s .

⁷ It is plausible that depositors' safe investment is less remunerative than that available to banks; banks can purchase, for example, short-term securities issued by highly-rated governments with minimal transaction costs. Nonfinancial institutions and households normally do not have this opportunity.

because it avoids the introduction of variations in the supply of financing as bank riskiness varies, but it is not essential. Equilibrium obtains where the risk-adjusted expected return on bank deposits equals that on the available safe asset. Depositors cannot distinguish between banks, and so they need to take expectations across both realizations of returns on risky investments and the range of banks, both of which influence whether they receive the full return i or some lesser amount. Specifically, the equilibrium condition for depositors is that

$$U(s^D D) = \int_{\underline{K}}^{\bar{K}} \left[\int_0^{r^*} U(rL + s(D + K - L))f(r) + \int_{r^*}^{\infty} U(iD)f(r) \right] g(K). \quad (3)$$

It will be useful to define the response of the deposit rate to the aggregate amount of risky lending as

$$i_L = \frac{\partial i}{\partial L} = - \frac{\int_{\underline{K}}^{\bar{K}} \int_0^{r^*} (r - s)U'(rL + s(D + K - L))f(r)g(K)}{\int_{\underline{K}}^{\bar{K}} \int_{r^*}^{\infty} DU'(iD)f(r)g(K)}. \quad (4)$$

From (2), $(r - s) < 0$ for all $r < r^*$, and all other terms are obviously positive. Hence, $i_L > 0$, that is, depositors demand higher compensation the more banks invest in risky lending and the greater the chance that the depositors will bear the downside risk. The results presented here would be attenuated but not vitiated if depositors had limited knowledge about the riskiness of individual banks; it is sufficient that there be some externality between banks.

In the absence of prudential regulations, the market equilibrium involves all banks investing exclusively in the risky asset. This is typically suboptimal for all concerned because each individual bank fails to take into account the effect of its risk-taking on the well-being of depositors and on the cost of financing faced by all banks.

Effect of a risk-weighted minimum capital adequacy requirement

Suppose now that a risk-weighted minimum capital adequacy requirement (CAR, or Cooke ratio) is introduced. Thus, it is required that $K/L \geq \chi$. Why the requirement takes this particular form is not modeled explicitly; perhaps some international standard setter has imposed this requirement.

The minimum CAR χ is just binding for a bank that would freely chose the level of lending where

$$L = \frac{K}{\chi} = D + K,$$

so that $K = \chi D / (1 - \chi)$. Banks with lower capitalization invest K/χ in the risky asset and $(D + K - K/\chi)$ in the safe asset. Banks with higher capitalization are not constrained.

Since the aggregate supply of lending is

$$L^A = \int_{\underline{K}}^{\chi D/(1-\chi)} \frac{K}{\chi} g(K) + \int_{\chi D/(1-\chi)}^{\bar{K}} (D + K) g(K),$$

it can readily be shown that

$$L_{\chi}^A = \frac{\partial L^A}{\partial \chi} = \int_{\underline{K}}^{\chi D/(1-\chi)} \left(\frac{-K}{\chi^2} \right) g(K), \quad (5)$$

which is certainly negative, as one would expect: the higher the risk-weighted CAR, the less risky investment will be undertaken.

The issue to be addressed is how χ is determined, or equivalently, whose benefit is taken into account in choosing χ . A social planner would consider the profitability of all banks as well as the well-being of depositors. A captured regulator would take into account the interests of its captors. Three cases will be considered, namely, (i) when the banks capture the regulator and set prudential regulations to benefit all banks collectively; (ii) when a majority coalition of banks capture the regulator and set prudential regulations to benefit themselves; and (iii) when banks determine the choice of χ by lobbying among themselves. The cases are considered in turn before the socially optimal level of regulation is discussed.

Capture by all banks collectively

Suppose that banks get to choose the minimum CAR so as to maximize total bank profits, that is, each bank receives equal weight in the decision.⁸ Then their collective objective function is

$$\int_{\underline{K}}^{\chi D/(1-\chi)} \int_{r^*(\chi)}^{\infty} \left[\frac{rK}{\chi} + s \left(D + K - \frac{K}{\chi} \right) - iD \right] f(r) g(K) + \int_{\chi D/(1-\chi)}^{\bar{K}} \int_{r^*}^{\infty} [r(D + K) - iD] f(r) g(K), \quad (6)$$

where it should be borne in mind that r^* , the return that just bankrupts a bank, depends on χ when the capitalization constraint is binding:

$$r^*(\chi) = s - \chi s - \frac{\chi D(s - i)}{K}. \quad (7)$$

Taking the first order condition for a maximum with respect to χ and rearranging, one obtains the “collective” optimum, given the form of the capital regulation⁹

⁸ They will still wish to have a regulator because compliance with the minimum CAR must be monitored and enforced.

⁹ One could use calculus of variations to derive an optimal function $L(K)$ that maximizes banking sector expected profits. It is difficult to characterize this function without imposing much more structure on the model.

$$\chi^C = \left(\frac{- \int_{\underline{K}}^{\chi D/(1-\chi)} \int_{r^*(\chi)}^{\infty} (r-s)Kf(r)g(K)}{\int_{\underline{K}}^{\chi D/(1-\chi)} \int_{r^*(\chi)}^{\infty} i_L L_{\chi}^A Df(r)g(K) + \int_{\chi D/(1-\chi)}^{\bar{K}} \int_{r^*}^{\infty} i_L L_{\chi}^A Df(r)g(K)} \right)^{1/2}. \quad (8)$$

The numerator of (8) captures the cost to banks with capital between K and $\chi D/(1-\chi)$ of having to invest more in the relatively low-yield safe asset. The denominator captures the benefit to all banks of lower financing costs. Taking into account (4) and (5), it can be shown that both numerator and denominator are positive, and the second order conditions can be checked to confirm that the positive root is the maximand. Hence, banks would voluntarily submit to capital requirements, which act as a device to force poorly capitalized banks to take into account the effect of their risk-taking on the financing costs borne by all banks.

The integral with respect to r in the numerator of (8) can be shown to be an upward sloping and concave function of K . Hence, a mean preserving spread of K over the relevant range reduces the numerator. The denominator contains two components: the first integral with respect to r is a downward sloping function of K because, as shown by (7), r^* is an increasing function of K when the capitalization constraint is binding. The second integral with respect to r is a downward sloping function of K . Hence, the two terms together form a convex function of K , and a mean preserving spread of K increases the denominator. Therefore, an increase in the variance of K tends to reduce the χ chosen collectively by the banks; the marginal cost of the regulation for additional poorly-capitalized banks exceeds the marginal benefit for additional well-capitalized banks.

Capture by a majority bank coalition

Even if banks capture the regulator, they may have difficulty maintaining unanimity over the optimal CAR: the better capitalized banks will have an interest in raising the CAR, and less well capitalized banks on which the constraint is binding will press for a lower requirement. Therefore, an alternative scenario is that the regulator is captured by a coalition of banks forming a stable majority. In particular, the banks with capitalization at or above the median level form a “natural” coalition: each bank want all the others to take less risk and incur a lower probability of failure, but the poorly capitalized banks are of particular concern to the sector as a whole. Therefore, the well capitalized banks have an incentive to “gang up” on the poorly capitalized banks, and suffer no costs so long as the CAR is not binding on them. However, to achieve a majority, the median bank must be included, to which end it must be satisfied that belonging to the coalition is worthwhile.

According to the median voter theorem, the median bank will determine the choice of χ for the coalition.¹⁰ There are two possibilities: if the CAR is not binding on the median bank, its objective function is:

¹⁰ The conditions obtain for the median voter theorem to apply: banks’ preferences are defined along a single dimension, and each bank’s preferences are single-peaked in that one dimension (see Chapter 3 of Drazen, 2000, for a concise exposition).

$$E(\Pi^M) = \int_{r^*M}^{\infty} (r(D + K) - iD)f(r) \quad (9)$$

where the superscript M refers to the median. The objective function is maximized with respect to χ , taking into account the effect on aggregate stock of risky lending and financing. Since however

$$\frac{dE(\Pi^M)}{d\chi} = \int_{r^*M}^{\infty} -i_L L_{\chi}^A Df(r) > 0,$$

the median bank (and all better capitalized banks) benefits more, the higher χ is, until the constraint is just not binding. Hence, the median bank chooses for the coalition

$$\chi^M = \frac{K^M}{L^M}, \quad (10)$$

the median bank's actual ratio of capital to risky assets. The constraint is binding on all less well-capitalized banks. Note that the choice of CAR does not depend on the distribution of capitalization around the median. Hence, even if the system suffers shocks that, for example, reduce the capitalization of weak banks, the dominant majority of banks will not seek a change in prudential regulations. A change will be demanded, however, when a shock is so large that the prudential regulations are substantially binding on the median bank. Moreover, it should already be intuitive, and it will be shown, that the coalition of well-capitalized banks could choose a CAR above the social optimum.

It is also possible that the median bank will choose a CAR that will be binding on itself, if it thereby obtains enough benefit in the form of lower financing costs. If the minimum CAR is binding on the median bank (a condition designated by the superscript MB), its objective function is

$$E(\Pi^{MB}) = \int_{r^*MB}^{\infty} \left[\frac{rK}{\chi} + s \left(D + K - \frac{K}{\chi} \right) - iD \right] f(r). \quad (11)$$

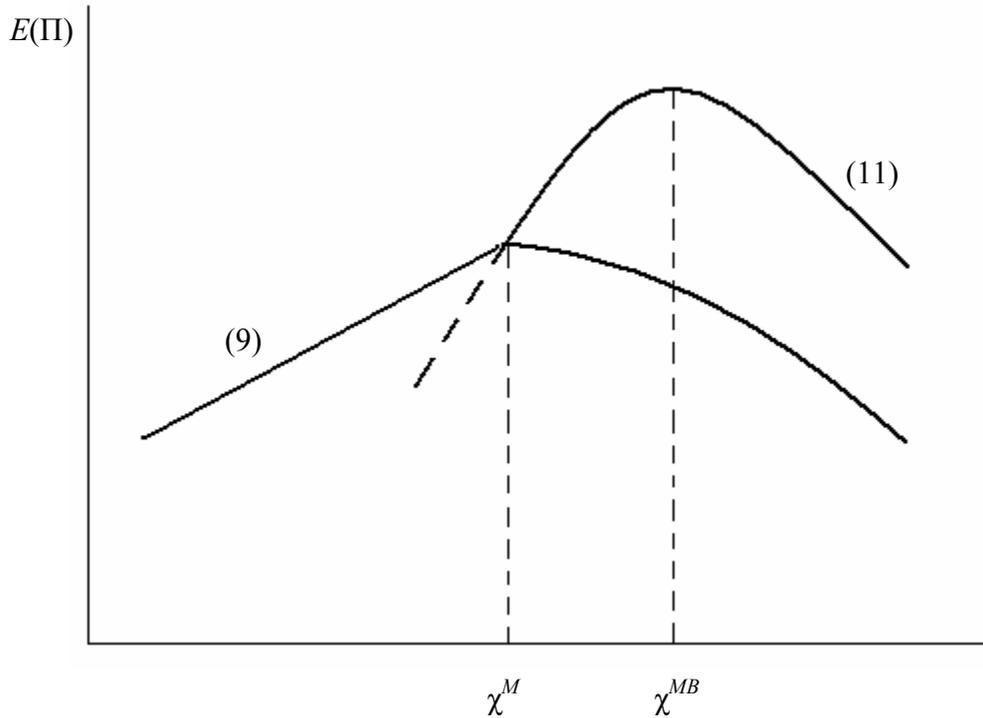
Using the first order conditions for a maximum and rearranging, one obtains the optimum:

$$\chi^{MB} = \left(\frac{- \int_{r^*MB}^{\infty} (r - s) K f(r)}{\int_{r^*MB}^{\infty} i_L L_{\chi}^A Df(r)} \right)^{\frac{1}{2}}. \quad (12)$$

The numerator of (12) captures the cost to the median bank of having to invest more in the relatively low-yield safe asset, and the denominator captures its benefit of lower financing costs when the portfolio of banks as a whole becomes less risky. As before, both the denominator and the numerator are positive, and so the solution for the maximand is defined and positive. Note that this solution applies only if parameters are such that $\chi^M < \chi^{MB}$. This situation can be illustrated in Figure 1, where one curve represents the objective function

given by (9) and the other represents that given by (11). The curves necessarily intersect where $\chi^M = \chi^{MB}$, and the median bank imposes the CAR on itself (and other relatively well-capitalized banks) when the objective function given by equation (11) reaches a maximum at a level above χ^M .

Figure 1. Optimal Minimum CAR for the Median Bank



The minimum CAR chosen by the coalition of well-capitalized banks generally exceeds that which would be chosen by banks collectively. Even when the coalition chooses χ^{MB} which binds on some members of the coalition, the collective optimum is lower. To show this result, compare (8) and (12). It has already been demonstrated that (8) is a decreasing function of the spread of K . For that reason alone the optimum evaluated by integrating across K will be lower than that evaluated at the median (with the sufficient condition that the distribution of K is not extremely skewed). Moreover, the numerator of (8) involves an integral across the lower portion of the distribution of K of an increasing function of K , which will be less than the comparable function evaluated at the median. This result is strengthened when the coalition chooses to set the CAR at χ^M , the median level, without regard for the effect on less well-capitalized banks; then $\chi^M > \chi^{MB} > \chi^C$.

In practice, regulations cannot normally be changed very rapidly. Hence, even when banks have captured the regulator, they need to set regulations in advance of knowing their situation exactly. The median bank, for example, may suffer negative or positive shocks to its level of capitalization before it has another chance to change the minimum CAR. Therefore, the chosen regulation may turn out ex post to be too restrictive or too loose. If such uncertainty exists, the coalition will choose a lower minimum CAR: if the median bank

knows only that its capital level will fall within some range $[\underline{K}^M, \overline{K}^M]$ with a distribution $h(K^M)$, then it will choose χ to maximize its expected profits based on an objective function similar to (6), but with $g(K)$ replaced with $h(K^M)$ and adjusted end-points. Hence, the chosen χ will be given by an equation analogous to (8), which, as has been shown, generally yields a lower minimum CAR than would be chosen under certainty. Insofar as uncertainty about future capitalization itself varies over time and tends to increase during periods of strain or crisis, banks' desired minimum CAR may be cyclical.

Determination of the minimum CAR through lobbying

So far it has been assumed that capturing the regulator is costless and that banks choose the minimum CAR on the basis of "one bank-one vote." However, regulatory capture may require the expenditure of resources on what might be termed lobbying. Once one allows for explicit lobbying costs, consideration must be given to the possibility that some banks (and other interest groups) have more at stake or deeper pockets, and so are willing to expend more on lobbying.

An individual bank will be willing to bear the costs of lobbying only if its individual actions will have an impact; with a continuum of banks, each has an incentive to free ride on the lobbying of others. Therefore, it is useful to recast the model in terms of banks of significant market size.¹¹ In particular, suppose that there are just two banks, indexed by $j = 1, 2$, each with an endowment of capital and deposits of $\{K_j, D_j\}$. Bank 1 is less well capitalized, and it is assumed that the minimum CAR is binding on that bank (this will also be the equilibrium outcome). Each bank expends λ_j on lobbying efforts. Then the expected profit functions for banks 1 and 2 are, respectively,

$$E(\Pi_1) = \int_{r^*_1}^{\infty} \left[\frac{rK_1}{\chi} + s \left(D_1 + K_1 - \frac{K_1}{\chi} \right) - iD_1 - \lambda_1 \right] f(r), \quad (13)$$

and

$$E(\Pi_2) = \int_{r^*_2}^{\infty} [r(D_2 + K_2) - iD_2 - \lambda_2] f(r). \quad (14)$$

The banks choose lobbying effort λ_j according to a Nash equilibrium, where each takes the other's lobbying effort as given. The outcome is a common minimum CAR given by the average of their respective desired outcomes, weighted by relative lobbying effort:

$$\chi = \frac{\lambda_1}{\lambda_1 + \lambda_2} \chi_1 + \frac{\lambda_2}{\lambda_1 + \lambda_2} \chi_2, \quad (15)$$

¹¹ One could also think of the agents as associations of similar banks that are able to levy contributions from their membership.

where χ_j is assumed equal to bank j 's unconstrained CAR, that is, $\chi_j = K_j/(D_j + K_j)$. Since bank 1 is less well capitalized, $\chi_1 < \chi_2$. Hence, the lobbying outcome is a minimum CAR that is somewhere between that desired by the less well capitalized bank and the higher level desired by the better capitalized bank, and bank 1 is indeed constrained by the regulation. In what follows it will be convenient to assume that the sensitivity of the deposit rate to aggregate lending (i_L) is constant. Note that $L^A_\chi = -K_1/\chi^2$. The respective first order conditions for the choice of lobbying effort derived from (13) and (14) are

$$\int_{r^*_1}^{\infty} \left[\left(\frac{-(r-s-i_L D_1)K_1}{\chi^2} \right) \frac{\partial \chi}{\partial \lambda_1} - 1 \right] f(r) = 0, \quad (16)$$

and

$$\int_{r^*_2}^{\infty} \left[\left(\frac{-i_L D_2 K_1}{\chi^2} \right) \frac{\partial \chi}{\partial \lambda_2} - 1 \right] f(r) = 0. \quad (17)$$

Using (16), (17) and the fact that, from (15),

$$\frac{\partial \chi}{\partial \lambda_j} = \frac{\lambda_k (\chi_j - \chi_k)}{(\lambda_j + \lambda_k)^2}, \quad k = 3 - j, \quad (18)$$

it can be shown that

$$\frac{\lambda_2}{\lambda_1} = \left(\int_{r^*_1}^{\infty} f(r) \right) \left(\int_{r^*_1}^{\infty} \left[\frac{-(r-s-i_L D_1)}{i_L D_2} \right] f(r) \right)^{-1}. \quad (19)$$

The first term captures the marginal direct cost of lobbying, and the second term captures the marginal net benefit for bank 1 of a higher χ relative to that for bank 2. Taking the partial derivatives of this expression yields intuitive results. For example, bank 2 will lobby relatively hard, and hence the minimum CAR will be higher, the larger is D_2 , that is, the more important it is to bank 2 to obtain cheaper financing by making deposits on average less risky. Bank 1 will lobby less, and accept a higher minimum CAR in exchange for cheaper financing, the larger is D_1 . Bank 1 will lobby harder the higher r is, when it is more valuable to be able to invest more in the risky lending. Bank 1 will also lobby harder the lower K_1 is, when the constraint is especially binding; banks in difficulties will try especially hard to influence regulations in their favor.

The socially optimal capital requirement

The way this model is set up, ex ante externalities exist between banks only: risky behavior by one bank raises the cost of funding for all banks, but depositors are indifferent because higher risk is compensated by a higher interest rate on deposits. Depositors in an individual failed bank are hurt ex post, but that is a risk that they freely chose. Hence, the socially optimal minimum CAR corresponds to that which would be chosen by banks acting

collectively and given by (8). Within the confines of the model, the majority coalition of banks would certainly choose a higher minimum CAR than would a noncaptured social planner. The minimum CAR chosen through lobbying might be higher or lower than the social optimum.

However, it is easy to see how the model could be extended to introduce other considerations relevant to the social planner. For example, bank failure may impose costs on borrowing firms and their employees and suppliers that neither banks nor depositors take into account. Also, if the supply of deposits were elastic, depositors would be affected by changes in the supply of savings instruments with different risk-return characteristics. With such an extension, the social planner would take into account the well-being of nonbanks and also of all banks. Hence, the social planner would in general apply a higher minimum CAR than would all banks acting collectively. The minimum CAR favored by a coalition of well capitalized banks might be higher or lower than that favored by the social planner, which takes into account the well-being of less well capitalized banks on which the coalition would wish to impose the costs of regulation.

Extensions

In the interests of clarity, the model contains only one form of interaction between the banks, namely through the cost of financing, only one prudential requirement, and only one dimension along which banks are differentiated, namely capitalization. Many of the qualitative results would carry over to a richer model, the elaboration of which is left to future research.

Banks may be affected by one another's behavior on the asset side of their balance sheets. For example, the failure of one bank may disrupt the financing for its borrowers, which may therefore themselves be forced into liquidation, and hence cause loan losses to other banks. Possibly, a bank with weak capitalization subject to moral hazard may compete aggressively for loan business (either in terms of price or collateral and other acceptance requirements), forcing down the expected returns available to other banks. In either case, the stronger banks will want to see prudential requirements that contain this negative externality.

The interaction among banks would be more complex if banks could raise new capital or disburse capital to shareholders so as to achieve a target risk-adjusted rate of return. The range of capitalization $[\underline{K}, \bar{K}]$ might vary, and the choice of portfolio composition might be affected, especially if loan riskiness is not purely idiosyncratic. A dynamic model would be needed to address issues related to entry and exit, and the role of future regulatory forbearance or protection of a bank's "franchise value."

Many prudential regulations in addition to the minimum CAR are designed to reduce systemic risk.¹² Banks have an interest in the enforcement of all such regulations on the

¹² The parameter χ can be thought of as representing any aspect of regulation or supervision that generates direct costs but is effective in reducing systemic risk.

sector as a whole, even if each bank thereby incurs some costs. Requirements that limit large exposures or sectoral concentration help ensure that banks are well diversified and therefore less likely to suffer catastrophic losses. Regulation of market risk, including limits on open foreign currency positions and provisions to contain operational risk, are also meant to reduce the probability of bank failure. Liquidity requirements may be favored because they reduce both banks' costs of monitoring each other when they interact through the money market and the likelihood of a systemic collapse in liquidity. Similarly, (incumbent) banks are likely to favor regulations on prompt corrective action (PCA), which may be especially important if banks compete with one another in the loan market.

One area of regulation of special importance here is that relating to transparency and market discipline. As mentioned above, if depositors can differentiate between banks and therefore demand differentiated remuneration of deposits, the systemic connection is weakened and there is less motivation for regulations, whether captured or not. Hence, requirements on a bank to disseminate information on its portfolio and other activities, which facilitates market discipline, can substitute for prudential limits on portfolio composition. However, disseminating information is costly for banks, and processing it is costly for providers of funds. In these circumstances, strong banks have more interest in transparency than weak banks, and it is possible that weak banks will try to mask unfavorable information, for example, by replicating the "signals" sent by stronger banks. Therefore, the trade-offs and the vulnerability to capture of regulations on transparency may be broadly similar to those affecting capitalization requirements, but with added complications related to the costs of regulation and banks' ability to transform or hide risk taking.

Political and institutional arrangements may themselves create incentives for banks to favor tight prudential requirements. For example, banks are often called upon by the central bank to contribute to the costs of resolving a failed institution. This connection may be formalized through a deposit guarantee scheme: a blanket deposit guarantee would in the first instance weaken the effect incorporated in the model because returns on deposits would no longer depend on the riskiness of bank portfolio. However, in practice banks receive much financing from sources not covered by deposit guarantees. Furthermore, most deposit guarantee schemes are paid for largely by banks themselves, through premiums which they pay to build up an ex ante reserve or to cover the costs of past payouts to depositors. In addition, a deposit guarantee reduces the incentive for depositors to monitor the condition of individual banks. These last two reasons suggest that a deposit guarantee scheme may increase the incentives for banks to capture the regulator and impose regulations, especially on weaker banks.

Banks are likely to be much less sympathetic towards nonprudential regulations, such as those that constrain pricing or impose requirements to lend to certain sectors or social groups. Some of these regulations may have the effect of reducing competition and thus raising monopolistic profits, but banks are likely to lobby heavily against others, especially those that have a "social" or distributive objective.

Such regulations are an expression of diversity of interest groups and stakeholders affected by banking regulations. The interests of small borrowers dependent on bank loans may differ from those of large borrowers with access to capital markets and banks in several countries.

The suppliers of funds include household savers, corporations, and other financial institutions. Banks themselves may be heterogeneous in several dimensions and therefore may not always share common interests or be able to build stable coalitions. Smaller banks or those with a regional funding and lending base may be in conflict with money center banks (as in the debates in the United States on bank branching and deposit insurance). The corporate structure of banks may affect how they view certain regulations: those that have concentrated ownership, for example, may face higher costs from limits to connected lending. In some countries there may be rivalry between local banks and foreign banks, which have fewer political connections but are not dependent on local funding or inherit a strong reputation from their parent institution. Moreover, the regulator may have its own interests: it will normally have an explicit mandate and be accountable to the public and the legislature, but may also act to further the interests of its own managers and staff, for example, to obtain a larger budget or accumulate more power, prestige, and autonomy. And besides differences in interests, groups may differ in resources and organizational ability.

A further complication is that many banks and especially large banks operate internationally: they compete for business with banks subject to other jurisdictions, and they can themselves relocate to jurisdictions with more agreeable regulatory regimes. Attention now turns to the possibility of regulatory arbitrage and regulatory competition.

IV. COMPETITION BETWEEN JURISDICTIONS

There is a widespread concern that regulatory jurisdictions that compete with one another will tend to introduce regulations that are individually and globally too lax. The fear is that financial institutions will move to jurisdictions that offer less onerous regulations (Dell’Ariccia and Marquez, 2001; Weinberg, 2002; and Ngo, 2004), or that national regulators will fail to take fully into account international spillovers (Sinn, 2001). Therefore, the equilibrium outcome is a “race to the bottom.”

In contrast, the illustrative model presented here suggests that competing jurisdictions may not always seek ever-weaker prudential regimes, even if they act in the interests of their resident financial institutions. A jurisdiction’s competitive strategy needs to weigh the direct costs of tough regulation against the higher financing costs provoked by a reputation of lax prudential rules and supervision.

Moreover, jurisdictions may become highly differentiated. Each jurisdiction may evolve into a “club” of similar institutions, so that some locations are dominated by institutions that favor demanding prudential rules, and others are havens for those institutions that are very sensitive to regulatory costs or that are less affected by spillovers from others. To illustrate this point as simply as possible, suppose that there are two jurisdictions, X and Y , which are similar except that banks in X generally have higher capitalization. (Perhaps the jurisdictions were once identical, but Y suffered more adverse shocks.) Therefore, the regulator imposes higher minimum CAR in X , and funding costs are lower: $\chi_X > \chi_Y$, $i_X < i_Y$.

Now consider a potential entrant with capital K which must choose in which jurisdiction to locate. If its capital is so high that the minimum CAR would nowhere be binding—that is,

$K > \chi_X D / (1 - \chi_X)$ —then it would certainly wish to locate in X , where funding costs are lower. The coalition of well capitalized banks in X is reinforced.

If the entrant's capitalization is lower, three cases are of interest: it could enter X and accept a binding minimum CAR; it could enter Y and not suffer a binding CAR; or it could enter Y , where even the lower minimum CAR is binding if $K < \chi_Y D / (1 - \chi_Y)$. The expected profits in the three cases are respectively as follows (where superscripts B and NB designate “binding” and “nonbinding,” respectively, and subscripts designate the jurisdictions):

$$E(\Pi_X^B) = \int_{r^*(i_X)}^{\infty} \left[\frac{rK}{\chi_X} + s \left(D + K - \frac{K}{\chi_X} \right) - i_X D \right] f(r), \text{ where } K < \chi_X D / (1 - \chi_X) \quad (20)$$

$$E(\Pi_Y^{NB}) = \int_{r^*(i_Y)}^{\infty} (r(D + K) - i_Y D) f(r), \quad \text{where } K > \chi_Y D / (1 - \chi_Y) \quad (21)$$

$$E(\Pi_Y^B) = \int_{r^*(i_Y)}^{\infty} \left[\frac{rK}{\chi_Y} + s \left(D + K - \frac{K}{\chi_Y} \right) - i_Y D \right] f(r), \text{ where } K < \chi_Y D / (1 - \chi_Y). \quad (22)$$

The bank will compare pairs of these expected profits depending on which constraints are binding. The bank will choose to locate in Y if χ_X is very high relative to χ_Y , or if i_Y is not much higher than i_X . However, the choice is contingent on the entrant's own capitalization, such that a poorly capitalized bank is more likely to prefer the jurisdiction with a weaker capital requirement. These possibilities are illustrated in Figures 2 and 3, which are in different spaces; the slopes of the curves can be derived from equations (20), (21), and (22).

Constrained profitability in X is higher than unconstrained profitability in Y to the right of the vertical line in Figure 2, which is relevant if the entrant's capitalization is such that it falls into the middle stripe of Figure 3, and funding is much more expensive in Y than in X . Expected profits of an entrant to Y are constrained by the respective minimum CAR, that is, $E(\Pi_Y^B)$, would exceed those available to it in X , that is, $E(\Pi_X^B)$, in a situation corresponding to being above the sloped line in Figure 2 and in the lowest stripe in Figure 3 with a low interest differential.

Figure 2. Choice of Jurisdiction, Interest Rate Differential, and Relative Minimum CAR

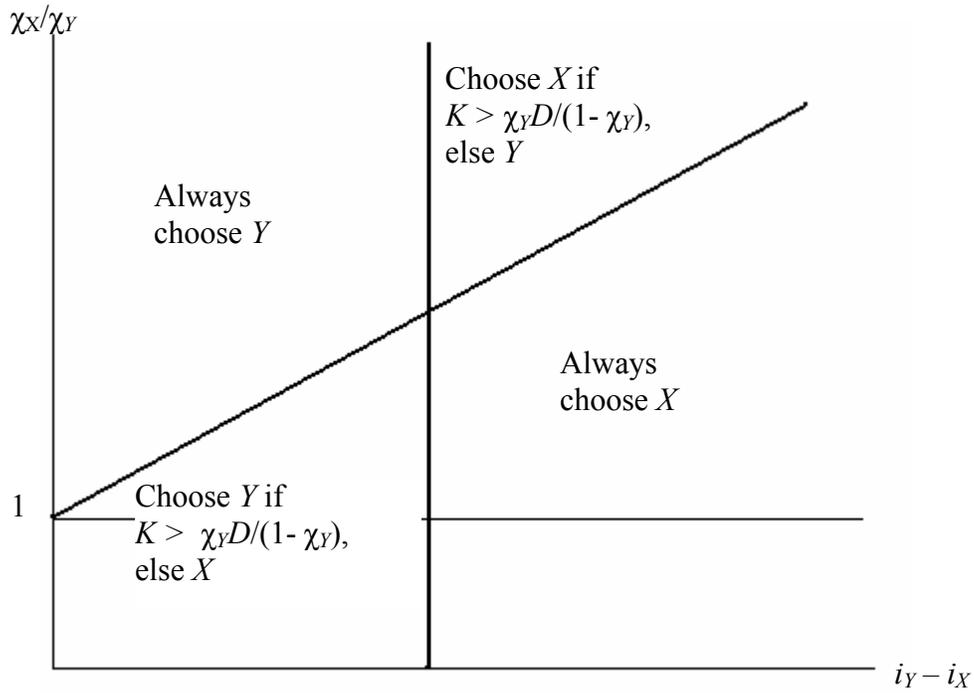
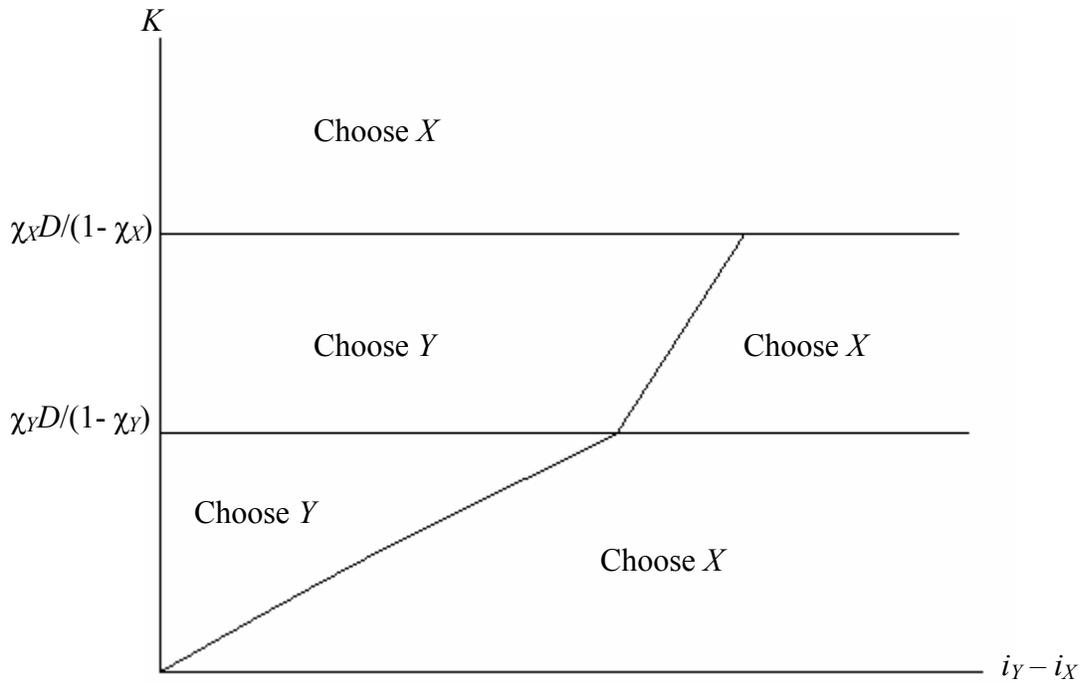


Figure 3. Choice of Jurisdiction, Interest Rate Differential, and Capitalization



The implication is that the characteristics of a jurisdiction may become self-reinforcing and that regulatory regimes need not converge. The sound banks want to be with other sound banks, and riskier banks want to avoid the prudential rules that benefit mainly stronger banks. The jurisdictions might be said to differentiate their regulatory “product” to discriminate among the financial institutions that are their “clients,” and thus avoid direct competition.¹³ Hence also the constituency of banks that capture the regulator in a jurisdiction may become more homogeneous over time, and conflicts among members of the constituency may diminish.¹⁴

V. CONCLUSIONS

The prudential regulation and supervision of the financial sector are meant to reduce systemic risk and other risks that arise from asymmetric information. They may therefore be of benefit to the regulated financial institutions themselves: precisely because of the systemic features of a financial system, each individual institution has an interest in the soundness of others. Hence, an institution may welcome regulations even if they impose compliance costs in the form of higher operating expenses and restrictions on its portfolio choices. The model presented here formalizes this intuition, and indeed suggests that in some instances financial institutions or at least a dominant group of institutions may favor regulations that are excessively restrictive relative to the social optimum. This tendency to regulation can arise not just from a desire to restrict competition, but also from a recognition of how risky behavior by one institution can spill over to the sector as a whole.

The nature of financial systems suggests also that financial institutions will have many means at their disposal to influence regulations in their favor and opportunities to effect some degree of capture of the regulator or the political authority that stands over the regulator. The complexity of financial systems, the need in many circumstances to maintain confidentiality, and the normally diffuse interests of the nonfinancial sector in financial sector regulation suggest that the institutions will exert a dominant influence. The available evidence indicates that some degree of regulatory capture by financial institutions is in fact a significant phenomenon, even if regulators are not fully captured.

Available evidence suggests also the financial sectors do not always compete to have the most relaxed regulatory regime. Rather, as predicted by the model, jurisdictions may

¹³ Such a sorting equilibrium goes back to Tiebout (1956). There have been instances where several categories of financial institution operate in one country but with competing regulators (Choi, 2002, Weinberg, 2002). Rosen (2003) argues that competition among U.S. financial regulators is beneficial because it allows financial institutions to shift to the most appropriate regulator.

¹⁴ It is possible that the degree of differentiation is self-limiting. For example, if many weak banks enter a jurisdiction, the cost of funding there may rise appreciably. Therefore, additional entrants may prefer to go to the jurisdiction with tighter, binding regulation but lower funding costs.

specialize, with each establishing a regulatory regime that is to some extent tailored to the needs of incumbents and to those of the institutions that the incumbents would wish to attract. There may be some jurisdictions that offer the financial sector equivalent of “flags of convenience,” but others will be eager to achieve high standards and be seen to attain them.

Regulatory capture in banking is not entirely bad. The regulations favored by banks and other financial institutions may promote financial stability and thus largely coincide with what would promote overall welfare and efficiency; this possibility is shown in the model. Once financial institutions are convinced that regulation is in their interest, it may be relatively easy to introduce worthwhile new measures. Thus, effective financial sector reform may require efforts to educate institutions about their “enlightened self interest.”

Nonetheless, there may be costs, for example, in terms of restrictions on competition and excessive constraints on the provision of risky lending. These costs may be borne largely by a subset of institutions (including entrants) whose interests diverge from those of the dominant part of the banking sector and by users of financial services and those seeking financing who have less ability to exercise influence over regulators.

The possibility of regulatory capture therefore needs to be taken into account in designing governance arrangements for regulators and supervisors. Suitable governance arrangements need to achieve independence from undue influences from the regulated institutions and from other interest groups, but also need to ensure accountability and expertise on the regulated industry (see Quintyn and Taylor, 2004, for example). Trade-offs are likely: close contacts and consultation between the regulators and financial institutions are needed to ensure that the regulator keeps abreast of financial sector developments, and also that full use is made of institutions’ specialized knowledge, for example, of the relative compliance costs of various possible measures. However, these contacts may facilitate capture. The financing of the regulator out of fees imposed on financial institutions may reduce its dependence on the government budget mechanism, which itself may be subject to regulatory capture, but may increase the regulator’s sense of obligation towards the regulatees. On the side of expenses, regulatory capture can be discouraged by setting the level and structure of remuneration of regulators so as to reduce incentives to take up employment in the regulated institutions.

The results presented here have two additional implications that are especially relevant for standard-setting bodies and organizations such as the International Monetary Fund and the World Bank that are committed to the sound development of an efficient financial sector: First, the strength of the regulatory and supervisory system will differ across countries, such that the system is likely to be weakest where the financial sector is itself generally weak. Second, even if a country has a history of effective bank regulation and supervision during good times, in the event of a large negative shock, the banks may succeed in obtaining forbearance and a loosening of regulations. Both implications are based on the result that causality may run from financial weakness to poor regulation and supervision, and not just in the other direction.

REFERENCES

- Abrams, Burton A., and Russell F. Settle, 1993, "Pressure-group Influence and Institutional Change: Branch-banking Legislation During the Great Depression," *Public Choice*, Vol. 77, pp. 687-705.
- Boyd, John H., and Gianni De Nicoló, 2003, "Bank Risk Taking and Competition Revised," IMF Working Paper 03/114 (Washington: International Monetary Fund).
- Choi, Jin-Wook, 2002, "Regulatory Forbearance and Financial Crisis in South Korea," *Asian Survey*, Vol. 4, No. 2, pp. 251-275.
- Dell'Ariccia, Giovanni, and Robert Marquez, 2001, "Competition Among Regulators," IMF Working Paper 01/73 (Washington: International Monetary Fund).
- Drazen, Allan, 2000, *Political Economy in Macroeconomics*, (Princeton N.J.: Princeton University Press).
- European Shadow Financial Regulatory Committee, 2003, "Bank Supervisors' Business: Risk Management of Systemic Stability," Statement No. 16 (Brussels: Center for European Policy Studies).
- Godfrey, Jayne M., and Ian A. Langfield-Smith, 2004, "Regulatory Capture in the Globalization of Accounting Standards," Monash University Working Paper (Victoria, Australia: Monash University).
- Kane, Edward J, 1990, *The S&L Insurance Mess: How Did It Happen?* (Washington: Urban Institute Press).
- , 2001, "Dynamic Inconsistency of Capital Forbearance: Long-Run vs. Short-Run Effects of Too-Big-to-Fail Policymaking," *Pacific Basin Financial Journal*, Vol. 9, No. 4 (August), pp. 281–99.
- Kroszner, Randall S., and Philip E. Strahan, 2000, "Obstacles to Optimal Policy: The Interplay of Political and Economics in Shaping Bank Supervision and Regulation Reforms," NBER Working paper No. 7582 (Cambridge, Massachusetts: National Bureau of Economic Research).
- Laffont, Jean-Jacques, and Jean Tirole, 1991, "The Politics of Government Decision-Making: A Theory of Regulatory Capture," *Quarterly Journal of Economics*, pp. 1089-1127.
- , 1993, *A Theory of Incentives in Procurement and Regulation* (Cambridge, Massachusetts: MIT Press).
- Laffont, Jean-Jacques, 1999, "Political economy, information and incentives," *European Economic Review*, Vol. 43, pp. 649-69.

- Ngo, Phong T.H., 2004, "International Financial Regulation, Regulatory Risk and the Cost of Capital: A Summary," Working Paper (Cambera: School of Economics, Australian National University).
- Quintyn, Marc, and Michael W. Taylor, 2004, "Should Financial Sector Regulators be Independent?" IMF Economic Issues Paper No. 32 (Washington: International Monetary Fund).
- Rosen, Richard J., 2003, "Is Three A Crowd? Competition Among Regulators in Banking" *Journal of Money, Credit and Banking*, Vol. 35 No. 6, pp. 967–98.
- Rosenbluth, Frances, and Ross Schaap, 2003, "The Domestic Politics of Banking Regulation," *International Organization*, Vol. 57, Spring, pp. 307–36.
- Siegelbaum, Paul J., Khaled Sherif, Michael Borish, and George Clarke, 2002, *Structural Adjustment in Transition: Case Studies from Albania, Azerbaijan, Kyrgyz Republic and Moldova*, World Bank Discussion Paper No. 420 (Washington: World Bank).
- Sinn, Hans-Werner, 2001, "Risk Taking, Limited Liability and the Competition of Bank Regulators," NBER Working Paper No. 8669 (Cambridge, Massachusetts: National Bureau of Economic Research).
- Stigler, G., 1971, "The Economic Theory of Regulation," *Bell Journal of Economics*, Vol. 2, pp. 3–21.
- Tiebout, C., 1956, "A Pure Theory of Local Expenditures," *Journal of Political Economy*, Vol. 64, pp. 416–24.
- Weinberg, John A., 2002, "Competition Among Bank Regulators," *Economic Quarterly-Federal Reserve Bank of Richmond*, Vol. 88 No. 4, Fall, pp. 10–36.
- Woodward, Susan E., 1998, "Regulatory Capture at the U.S. Securities and Exchange Commission," Sand Hill Econometrics Working Paper (Palo Alto California: Sand Hill Econometrics). Available on the Internet at <http://www.sandhillecon.com/pdf/RegulatoryCapture.pdf>.