Competition Among Bank Regulators

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The organization of bank regulation in the United States is somewhat peculiar. Banks answer to an array of regulators, both federal and state. To begin with, a bank can choose a national or a state charter. National banks are regulated by the Office of the Comptroller of the Currency (OCC). State banks are regulated by their home states, as well as by a federal regulator. The Federal Reserve System regulates state-chartered banks that are Federal Reserve members, and the Federal Deposit Insurance Corporation (FDIC) regulates state, nonmember banks. A bank, by its choice of charter and Federal Reserve membership, chooses its regulators. There is a sense, then, in which U.S. federal bank regulators are in competition with each other. How does this competition affect bank regulation in the United States? On the one hand, one might conclude that the need to compete with other agencies would motivate a regulator to perform its tasks as effectively and efficiently as possible. On the other hand, one might argue that the desire to attract more clients could drive a regulatory agency to be loose.

Banking is not the only industry in which alternative regulatory agencies compete with one another. Most other instances, however, involve different geographic jurisdictions. For instance, to the extent that environmental regulations vary from state to state, a manufacturer's decision on plant location entails a choice among potential regulators. The stringency of such regulations then has the potential to become one tool by which states compete to attract businesses. One could ask the same question about this competition as is often asked about the interaction among bank regulators. Does competition lead to effective or excessively loose environmental control?

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When the effects of the regulated activity, polluting for instance, are predominantly local, geographic regulatory competition, as in the case of state-level environmental rules, is analogous to the jurisdictional competition studied by Tiebout (1956). Tiebout's direct concern was the provision of "local public goods" by local governments funded with local taxes in a setting with a mobile population. His conclusion was that competition in the joint setting of taxes and levels of public goods and services would lead to efficient levels of government expenditures. The same logic applies to local regulation of activities with local effects.

Bank regulation, however, does not have the same geographical limits as some environmental regulation. While state banks are regulated locally by state supervisory agencies, all banks have federal regulators. Further, a bank can change its federal regulator without having to relocate or make any other significant change in its activities. In this environment, does the Tiebout logic of beneficial competition still apply?

This article highlights how the effects of alternative regulatory structures depend on assumptions about such underlying factors as the regulators' objectives, and the way in which regulators' costs are financed. This point can best be made in the context of a model that captures important elements of bank and bank regulator activities. Section 2 presents such a model. The model's emphasis is on the role of bank examinations in assessing the quality of bank assets in the presence of deposit insurance. In the context of this model, an efficient regulatory policy is defined. Possible regulatory outcomes are then studied under alternative assumptions about regulators' preferences regarding banking industry performance and the extent to which deposit insurance and bank examination are integrated activities financed under a consolidated budget constraint. In some cases, regulatory competition leads to efficient policy choices, while in others competition results in inefficient outcomes. Notably, when the financing of regulation and deposit insurance is not integrated, competition among regulators can impose excessive costs on deposit insurance.

1. BACKGROUND

In discussions about rivalry among alternative bank regulators, a common concern is that regulators will "race to the bottom." Each regulator, it is argued, will want to attract as many banks into its constituency as possible. Further, this incentive to attract "client" banks will outweigh the regulators' interest in controlling bank risk-taking incentives. This so-called "competition in laxity" will result in excessive costs to the deposit insurance system. The possibility of a race to the bottom, as discussed by Scott (1977), has partly motivated a number of proposals for the consolidation of federal bank regulation.

The notion that competition might result in excessively lax or otherwise inefficient regulation is not unique to banking. In the general area of corporate governance and the market for corporate control, it has been argued that states compete to be corporations' charter locations by passing laws that inhibit corporate takeovers. Since incumbent managers make location decisions, they might be influenced by laws that protect their incumbency. Karpoff and Malatesta, for instance (1989), report evidence that supports this hypothesis. Similar arguments have been made about local environmental controls when the effects of pollution extend beyond the local area. Local governments and their constituents enjoy the economic benefits of a manufacturer's decision to locate in their area but the environmental cost is shared more widely.

These assertions that regulation results in a "race to the bottom" by economic efficiency standards stand in sharp contrast to Tiebout's notion of beneficial competition. The key difference is seen in the example of environmental controls. Tiebout's result applies when both the costs and the benefits of the pollution-generating activity accrue to the constituents of the local governmental decision maker. Inefficient regulatory choices are more likely to arise when the costs spill over between localities.

The clean dichotomy between beneficial and harmful regulatory competition relies on an additional important assumption involving the governmental decision makers' objectives. In the case of environmental regulation, the assumption is essentially that the local government acts to maximize its constituents' welfare. Other objectives are also possible, however. Stigler (1971) and Peltzman (1976), and the extensive literature that follows their seminal work emphasize the political economy of interest groups as a determining factor in regulatory decisions. Along these lines, one idea that is often voiced is that of "regulatory capture." This term expresses the notion that regulatory actions may be driven more by the interests of the firms in the regulated industry than by considerations of general or consumer welfare. In reference to banking in particular, Kane (1996) has suggested that regulators' self-interest can shape the outcomes of regulation. But there are alternative assumptions that one might make about regulators' objectives. One possibility is that individuals who have some discretion in choosing regulatory actions might be motivated by their personal reputations and career concerns. Another possibility, particularly relevant to settings where regulators can compete with one another, is that agencies seek to maximize their influence by regulating a large portion of the industry.

Clearly, the effects of competition among regulators could depend on regulators' motivations. In a setting of regulatory capture, competition could exacerbate the tendency to weigh the interests of the regulated industry above consumer welfare. If regulators are concerned for their personal reputations, their behavior and their response to competition would depend further on how they believe industry outcomes affect their reputations. For instance, a concern for reputation might cause bank regulators to be conservative, preventing banks from taking actions that might have bad outcomes. Competition could counter this tendency by inducing regulators to loosen their control of risk taking in order to attract more client banks. While empirical evidence on the behavior of bank regulators and the effects of regulatory competition is sparse, Rosen (2001) has recently studied the characteristics and behavior of banks that switch their federal regulator. He finds evidence consistent with the idea that competition can be beneficial, as banks tend to improve their performance following a switch.

In addition to the underlying motives of regulators, another key factor affecting the way regulators behave under competition is the means of financing regulatory costs. A regulator that must cover all of its costs out of fees that it charges to its regulated businesses might behave quite differently from one that draws on general public funding. This distinction has in fact been highlighted in some recent discussions about the organization of bank regulation. The OCC, for instance, covers its expenses from examination fees, while the FDIC bundles regulation with deposit insurance, paying for both out of deposit insurance premiums. The OCC has argued (for example, in Hawke, 2002) that this difference can distort banks choices among their alternative federal regulators.

The following section sets out a model that focuses on the choice of a regulatory mechanism to control the risk-taking incentives of banks with insured deposits. That basic model provides a framework that allows the consideration of a number of alternative assumptions about the organization, financing, and motivation of regulators. An underlying assumption is that regulators have some discretion in choosing the parameters of their regulatory behavior. In the model, the key parameter is the frequency of examinations. While the actual degree of discretion exercised by bank regulators on this dimension is limited by statute, it is clear that, more generally, regulatory agencies have discretion over the intensity and informativeness of examinations, variables that would have the same effect as the simple probability that is chosen in the model.

2. A MODEL OF BANK REGULATION

A bank will be represented as an agent making an investment decision. The bank raises funds by issuing fully insured deposits. Depositors, therefore, are not particularly interesting actors in this model, as they supply funds perfectly elastically at the risk-free rate-of-return, normalized to zero. A bank raises a fixed amount of deposits, D, and can place funds into one of two investment projects, represented as "actions" a_0 and a_1. Each action results in a probability distribution over the set of possible outcomes, $R = \{-\theta, -1, 1, \theta\}$, where $1 < \theta < D$. The outcome is the bank's income (or loss), net of payment to depositors. Let $P(a)$ denote the vector of probabilities if action a is taken. The specification of $P(a_0)$ and $P(a_1)$ is meant to capture the notion that one of the actions, a_0, results in both higher risk and lower expected return than the other. A simple specification that captures this dominance is $P(a_0) = ((1 - p_0), 0, 0, p_0)$ and $P(a_1) = (0, (1 - p_1), p_1, 0)$, where $p_0 < 1/2 \leq p_1$. Hence, action a_0 represents a negative net-present-value investment, while a_1 has an expected return at least as great as the risk-free return.

Given full deposit insurance and the absence of any other regulation or intervention affecting its choice, the bank will choose the inferior action, a_0, if $p_0\theta > p_1$, which will be assumed to be true. The bank's choice of action is subject to moral hazard, since the action cannot be observed by an outsider without cost. Hence, the deposit insurer faces the challenge of ensuring that the bank takes the productive action a_1. The following analysis assumes a large number of banks, so that, if action a_1 is chosen by all banks, the fraction that earns positive income is equal to the probability p_1(and similarly for action a_0).

The problem facing the deposit insurer here is quite simple if the insurer can impose ex post, state-contingent payments by the bank. Specifically, since the outcome θ is possible only if the risky action is taken, the insurer could ensure the choice of the preferred action, a_1, by "taxing" the outcome θ sufficiently.[1] The analysis that follows assumes that such state-contingent payments are not feasible unless costly actions are taken. For instance, θ itself might be a random variable that takes a value of one or higher. Realized outcomes can be uncovered by the insurer only at a cost. Then, it is likely that such a tool would be used by the insurer in the event of negative returns in order to give the appropriate compensation to depositors. With positive returns, however, actual returns might remain unmeasured (by outsiders) as long as the bank makes its payments to depositors (plus an insurance "premium" that covers the expected costs of measurement for "failed banks"). This arrangement, however, would not solve the moral hazard problem of inducing the bank to take the preferred action. For any insurance premium π paid by "solvent" banks (banks with positive returns), if $p_0\theta > p_1$, as assumed, then $p_0(\theta - \pi) > p_1(1 - \pi)$. The left-hand side of this inequality would be the bank's net return under a_0, while the right-hand side gives the return if a_1 is chosen.

An alternative assumption that prevents the regulator from being able to force the bank to choose a_1 using ex post penalties involves the differential observability of different outcomes. For instance, one could assume that losses can be observed without cost but that positive outcomes cannot be distinguished. This amounts to assuming that it is possible to hide profits but

[1] For a discussion of using the regulation of bank capital structure to achieve ex post payments by banks, see Prescott (2001).

not to hide or otherwise falsify losses. Mathematically, this assumption, which is maintained below, is equivalent to assuming that the cost of monitoring realized losses is zero.

In addition to the ability to measure outcomes after the fact, suppose that the insurer has the ability to determine whether the bank has chosen a_0 or a_1 before outcomes are realized and the ability to close down a bank that is found to have chosen the inferior investment strategy. An examination to determine the bank's action choice results in a cost of c_a, and an early closure of a bank results in a loss of $l < (1 - p_0)\theta - p_0\theta$. The loss l can be thought of as the resource cost of closing a bank early, and this cost is less than the expected losses from a bank that has taken action a_0.

The regulator's problem is to choose a probability of examination ϕ, a course of action where an examination reveals a_0, and a fee π to charge banks that do not fail.[2] Any such combination, (π, ϕ), will be referred to as a policy. The assumptions above imply that it will be optimal to close a bank observed to have chosen a_0. Accordingly, an efficient policy can be defined as a ϕ and a π that solve the following problem.

$$\max\{p_1 - (1 - p_1) - \phi c_a\}$$

$$s.t. \quad p_1(1 - \pi) \geq (1 - \phi)p_0(\theta - \pi) \tag{1}$$

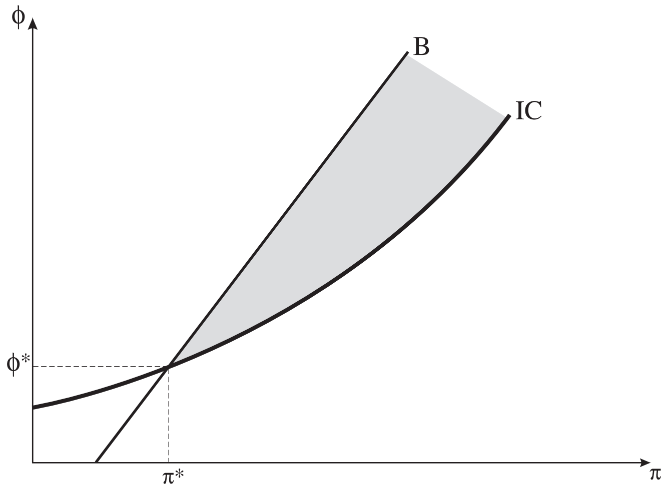
$$\text{and} \quad p_1\pi \geq \phi c_a + (1 - p_1) \tag{2}$$

The objective function here is simply the total net returns from the operations of the typical bank and the regulator – the bank's expected net income minus the regulator's examination costs. Payments from deposit insurance, payments to depositors, and fee payments from the bank to the regulator are simply transfer payments. Hence, the objective function represents the regulated banking industry's net contribution to social welfare. The first constraint is an incentive compatibility constraint, stating that it must be in the bank's interest to choose the productive action a_1. The left-hand side shows the expected return to the bank if it chooses a_1, while the right-hand side shows the expected return from a_0. In both cases, the bank only earns a positive return, out of which it pays the tax π, if it produces positive income. The right-hand side is weighted by $1 - \phi$, the probability of not being monitored. If the bank is monitored and discovered to have taken action a_0, the regulator closes the bank, and the bank earns nothing. The second constraint is a consolidated budget constraint for bank examination and insurance, stating that fees collected from solvent banks must cover the examination costs and the costs of deposit insurance payouts.

The choice of an efficient arrangement is quite simple. Note first that the objective is equivalent to minimizing examination costs, and therefore

[2] In principle, one could allow for two distinct fees, depending on whether a surviving bank has or has not been examined. In the analysis below, it is assumed that the regulator must charge a single, nondiscriminating fee to all surviving banks.

Figure 1 The Efficient Policy



Notes: π is the fee charged to successful banks.

ϕ is the probability that a bank is examined.

To satisfy the budget constraint, a policy (π, ϕ) must lie below B. To satisfy the incentive constraint, a policy must lie above IC. Consequently, the shaded area is the set of feasible, self-financing policies. The efficient investment choice a_1 can be achieved at the lowest resource cost (examination cost) at the efficient policy (π^*, ϕ^*).

the examination probability ϕ, subject to the two constraints. Second, the constraints can be represented by Figure 1 in which the incentive constraint is represented by the curve IC and the budget constraint by the line B.[3] On B, which is linear in π and ϕ, the value of π when ϕ is zero is $(1 - p_1)/p_1$. Also along B, when $\phi = 1, \pi = (c_a + 1 - p_1)/p_1$. The shape of the incentive constraint can be seen by rewriting it as

$$\phi \geq 1 - \frac{p_1(1 - \pi)}{p_0(\theta - \pi)}.$$

The right-hand side of this inequality is increasing and convex in π. The intercept of IC on the ϕ-axis is $1 - p_1/p_0\theta$, which is greater than zero. Note also that IC goes through the point (1, 1), so that IC and B cross at a point

[3] The figure incorporates the additional assumption that $c_a < 2p_1 - 1$. This assumption says that examination costs are less than the average net income under action a_1, and it is a sufficient condition for a nonempty constraint set. This assumption also ensures that the maximum value of the objective function in the efficient regulation problem is positive. That is, a regulated banking industry yields positive social surplus.

where both ϕ and π are less than one. Incentive compatibility requires that a policy (π, ϕ) lie above IC, while the budget constraint requires that a policy lie below B. The (π, ϕ) pairs that satisfy both constraints (that is, the pairs in the constraint set) are those that lie between IC and B. The efficient policy, which has the lowest ϕ in the constraint set, is denoted (π^*, ϕ^*), where π^* is found from the consolidated budget constraint at equality, given ϕ^*.

The efficient policy varies with the model's parameters largely in the way that one would suspect. For instance, a worsening of the incentive problem, as would be represented by an increase in θ, leads to an increase in ϕ^* to maintain incentive compatibility. To cover the increase in examination costs, π^* must increase as well. However, one such comparative statics result might seem unexpected. Specifically, an increase in c_a, the cost of an examination, leads to an *increase* in ϕ^*, the frequency of examinations. This counterintuitive result arises from the interaction of the budget and incentive constraints. First, the rising costs need to be met with an increase in the regulator's revenue by increasing π. Next, note that an increase in π causes both the right- and left-hand sides of the incentive constraint to fall. The left-hand side falls faster, however, meaning that the bank may now find it advantageous to take the high-risk, low-return action a_0. To counter this adverse incentive effect, it is necessary to increase the examination frequency.

3. BEHAVIOR OF A SINGLE REGULATOR WITH A CONSOLIDATED BUDGET CONSTRAINT

Suppose that a single government entity provides deposit insurance and performs bank examinations. This agency chooses a policy (π, ϕ) subject to the incentive and budget constraints in the problem above. Hence, the regulator knows that if it chooses a policy that does not satisfy the incentive constraint, banks will choose the high-risk, low-return investment, a_0. Under this investment choice, however, the regulator will find it impossible to balance its budget. A balanced budget is impossible because $p_0\theta - (1 - p_0)\theta < 0$, and the most the regulator can charge banks that have positive returns is θ. Hence, the necessity of meeting the budget constraint assures that the regulator will enforce the efficient action, independent of the regulator's objective. A regulator that was willing and able to generate a budget deficit and whose behavior was described by the regulatory capture hypothesis might tolerate action a_0. This action maximizes the banks' benefits from deposit insurance and limited liability.

While a regulator facing the consolidated budget constraint will always enforce the efficient action, that regulator will not always choose the efficient policy (π^*, ϕ^*). This choice depends on the regulator's objectives. A regulator that wants to minimize costs will choose (π^*, ϕ^*). There may be reasons, however, why a self-interested regulator would not seek to minimize costs.

Another of the regulator's objectives could involve their attitude toward bank failures. For example, a "conservative" regulator could be characterized as one who is particularly averse to bank failures that are seen after the fact to have been the result of excessive risk taking. That is, regulators may seek to avoid the eventual revelation that failed banks under their authority took action a_0. One way to achieve this goal would be for regulators to choose policies that ensure that no banks choose a_0. In the basic model, with homogeneous banks, such regulators will choose the efficient policy. The following subsection presents an extension of the model with heterogeneous banks in which a conservative regulator could choose too restrictive of a policy.

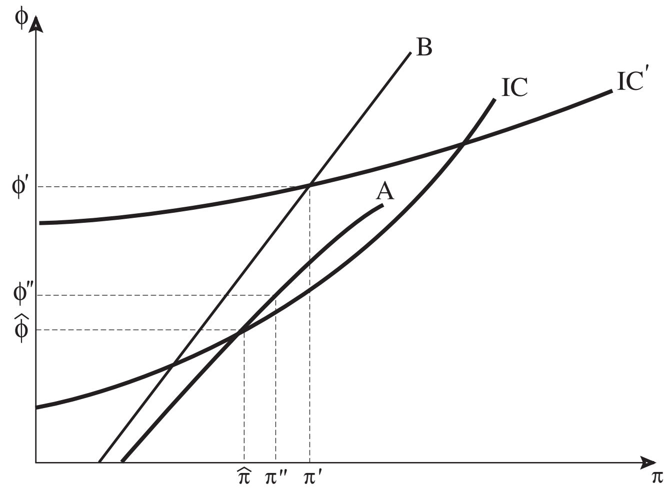
An Extension Involving Multiple Bank Types

Suppose that there are two types of banks, differentiated only by their high-risk lending opportunities. A fraction λ of the banks will earn returns of θ (with probability p_0) or $-\theta$ (with probability $1 - p_0$) if they take action a_0, as above. For the remaining banks, a_0 yields θ'(with probability p_0) or $-\theta'$ (with probability $1 - p_0$), where $\theta' > \theta$. The banks with θ' are "high risk," and those with θ are "low risk." If these two types of banks were regulated separately, with a separate (π, ϕ) for each, then the high-risk banks would have both a higher fee (π) and a higher frequency of examination (ϕ). Figure 2 shows the separate incentive constraints for the two types—IC for the low-risk banks and IC' for the high-risk. It takes more frequent examination, and therefore higher fees, to induce the high-risk bank to take the efficient action (a_1). As long as both types are taking the efficient action, then the budget constraint (B) is the same for both types. In this case, the efficient policies with separate treatment for the two types would be at the intersection of B and IC for the low-risk banks and at the intersection of B and IC', the point labeled (π', ϕ'), for the high-risk banks.

It may not be possible for the regulator to distinguish between the two types of banks. That is, the regulator may have to set a single policy (π, ϕ) that applies to all banks. In this case, the policy (π', ϕ') is the least-cost policy that insures that all banks take action a_1. However, this might not be the most efficient policy. In particular, if λ is close to 1, so that high-risk banks represent only a small fraction of the population, a policy that prevents only the low-risk banks from taking the high-risk action may be preferable. The best such policy is one that just satisfies the incentive constraint for the low-risk banks, allows high-risk banks to take action a_0, and satisfies the budget constraint,

$$
\begin{aligned}
& [\lambda p_1 + (1 - \lambda)(1 - \phi) p_0]\pi \\
\geq \; & \lambda(1 - p_1) + (1 - \lambda)(1 - \phi)(1 - p_0)\theta' + (1 - \lambda)\phi l + \phi c_a .
\end{aligned} \tag{3}
$$

Figure 2 Two Bank Types



Notes: The budget constraint if all banks take action a_1 is represented by B. If high-risk banks take a_0, while low-risk banks take a_1, then the budget constraint is given by A. The incentive constraints are IC for the low-risk banks and IC' for high-risk banks. The best *conservative* policy (that induces all banks to choose a_1) is (π', ϕ'). But there are relatively few high-risk banks, then the policy $(\widehat{\pi}, \widehat{\phi})$ is efficient.

This budget constraint is represented by A in Figure 2, and the policy at the intersection of A and IC is denoted $(\widehat{\pi}, \widehat{\phi})$. When λ is large, A lies very close to B, as in the figure. Compared to (π', ϕ'), $(\widehat{\pi}, \widehat{\phi})$ involves increased costs associated with the failures and early closures of high-risk banks but a cost savings associated with the reduced examination frequency for all banks. When λ is large enough, the savings will outweigh the costs, making $(\widehat{\pi}, \widehat{\phi})$ the efficient policy.

In this extension of the model, the chosen policy may depend on the regulator's preferences and objective. As always, a welfare-maximizing regulator will choose the efficient policy. Suppose, however, that the regulator has the conservative preferences outlined above. That is, the regulator is particularly concerned with preventing bank failures that are found after the fact to have been caused by "excessive" risk taking. This concern might arise, for instance, because the regulator is sensitive to how such failures will affect his or her reputation, either with the legislature or with the public at large. Such a conservative regulator might well choose the policy (π', ϕ'), even when the efficient policy is $(\widehat{\pi}, \widehat{\phi})$.[4] This, then, is a case where competitive pressure among alternative regulators might be particularly beneficial.

4. COMPETITION BETWEEN TWO COMBINED INSURANCE AND REGULATION AGENCIES

As seen above, the interaction between the incentive and insurance-regulation budget constraints is the key to determining desirable policies. As an initial step in examining "competition" among regulators, consider the case in which each regulator also has deposit insurance responsibilities for the banks that it regulates. That is, each regulator has its own consolidated budget constraint. The interaction between the regulators is then described as a game in which each regulator chooses a policy, and banks respond by choosing between the regulators. Assume that if the regulators choose identical policies, banks divide evenly between the regulators.

To complete the specification of the game requires a specification of how the regulators' payoffs respond to the policy choices. These payoff functions would reflect the regulators' objectives, which might include such goals as cost minimization, or minimization of risk taking by banks (preventing banks from choosing a_0). In a setting with competing regulators, it is likely that whatever other criteria the regulators are considering, they also care about their share of the regulated industry. This objective might, for instance, arise out of a desire by the regulator to maximize its influence on the industry.

In the previous subsection's extension of the basic model, suppose there are two regulators that care about two things. First, as discussed above, they are conservative, with a dislike for failures or early closures associated with banks taking the action a_0. Second, each has a preference for regulating as large a share of the industry as possible. One could put more structure on these preferences by, for instance, specifying a function by which the regulators evaluate different possible outcomes. Even without such added structure, however, it is possible to examine the nature of the interaction between regulators' policy choices. An equilibrium (*Nash equilibrium*) of the game is a pair of policy choices, one by each regulator, such that neither can do better by changing policy, given the policy of the other.

Notice first that given the nature of the game, and assuming the regulators have the same preferences, equilibrium must involve both regulators choosing

[4] A caveat is in order regarding the specification of "efficiency" when the regulator has a preference, whether personal or political, for preventing all banks from choosing a_0. Strictly speaking, the social welfare function would be the industry's net income minus examination costs *minus* any utility cost to the regulator that results if some banks choose a_0. The latter is assumed to be small relative to banks' income and examination costs. That is, while such a utility cost, even when small, can affect a regulator's choice of policy, it is assumed that the cost is small enough that it does not affect the determination of an efficient policy.

the same policy. If they have different policies and all banks prefer one of the policies, then the regulator with the less preferred policy will certainly prefer to mimic the other and share the industry.[5] Two likely candidates for equilibrium policies are the "conservative" policy (π', ϕ') from Figure 2 and the efficient policy $(\widehat{\pi}, \widehat{\phi})$. Recall that the latter policy is efficient under the assumption that λ, the relative number of low-risk banks, is large enough.

Can (π', ϕ') be an equilibrium policy? Suppose one regulator has chosen this policy and consider the other's optimal response. In particular, consider the second regulator's choice between (π', ϕ') and (π'', ϕ'') in Figure 2. All banks will prefer (π'', ϕ''); low-risk banks prefer it for its lower fee, and high-risk banks also enjoy the potential gains from taking the high-risk action. Note that this policy is also feasible, since it satisfies the consolidated budget constraint (A) that holds when high-risk banks choose a_0. Given that its counterpart has chosen (π', ϕ'), a regulator will choose (π'', ϕ'') if the perceived benefit of regulating more banks is greater than the perceived cost of allowing a small number of high-risk banks to take action a_0. Suppose the weights that the regulator places on these criteria are such that (π'', ϕ'') is the preferred of the two policies. Then (π', ϕ') is not an equilibrium policy. Neither, of course, is (π'', ϕ''), since a rival can attract all banks away with a policy along A with a lower π and a lower ϕ. In this case, bidding by regulators results in an equilibrium policy of $(\widehat{\pi}, \widehat{\phi})$. In contrast, the absence of competition results in the conservative policy of (π', ϕ'); a sole conservative regulator need not compete for clients and can instead focus only on making sure that no banks have an incentive to take a_0.

The discussion in this section implicitly involves a regulators' objective function that exhibits a trade-off between a taste for regulating as large a share of the industry as possible and a distaste for "excessive" risk taking by banks. The preceding paragraph describes a situation in which the former (the desire to increase "turf") is strong enough that it eliminates the conservative policy (π', ϕ') as a potential equilibrium outcome. Indeed, this is a case in which regulators' interest in increasing their turf serves a useful social purpose. Of course, it is possible for the other component of regulators' preferences, their desire to limit risk taking, to be strong enough to support (π', ϕ') as an equilibrium policy. The following example illustrates these points, by taking the assumptions of this section and adding an explicit regulatory objective function.

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[5] It is also possible for the regulators to have different policies and for each type of bank to prefer a different one of the policies. This could only happen, however, if at least one of the policies is not incentive compatible for at least one of the types, since the two bank types' preferences among incentive compatible policies (policies that induce the action a_1) are identical. A regulator that attracts only high-risk banks with a policy that induces action a_0 cannot satisfy its consolidated budget constraint. Therefore, such a mix of strategies is not an equilibrium outcome.

Example 1 *Label the regulators 1 and 2, and let regulator i's preferences be represented by*

$$\alpha F^i - \beta D^i$$

where F^i is the fraction of the industry that i regulates, and D^i is the fraction of the banks regulated by i that take action a_0. The parameters α and β measure the strength of the regulators' preferences for the two objectives. Now consider regulator 2's choice of policy if regulator 1 has chosen (π', ϕ'). In particular, consider regulator 2's choice between (π', ϕ') and a policy along A with lower π and ϕ than at (π', ϕ'). The point (π'', ϕ'') gives one such policy. If (π', ϕ') is preferred, then that is the equilibrium policy. If regulator 2 chooses (π', ϕ'), then the industry is evenly divided between the regulators, and no banks will choose a_0. That is, $F^2 = 1/2$ and $D^2 = 0$. On the other hand, regulator 2 can capture the entire industry by choosing (π'', ϕ'') at the cost of inducing high-risk banks to take action a_0. In this case, $F^2 = 1$, and $D^2 = (1 - \lambda)$. Regulator 2 will prefer (π', ϕ') over (π'', ϕ'') if $\alpha/2 \geq \alpha - \beta(1 - \lambda)$, that is if $\alpha/\beta \leq 2(1 - \lambda)$. As suggested above, if the relative distaste for risk taking is strong enough (if β is small enough relative to α), then the conservative policy (π', ϕ') can be an equilibrium. On the other hand, for any given preference specification, if the population of high-risk banks is small enough (λ is big enough), then (π', ϕ') will not be an equilibrium. When this is the case, then the efficient policy $(\widehat{\pi}, \widehat{\phi})$ is the equilibrium.

The efficient outcome that arises from regulatory competition is similar to the outcome that would arise in this environment if, instead of being determined by regulators, π and ϕ were set by private providers of deposit insurance with the ability to monitor and shut down banks under certain circumstances. A monopolist private insurer in this setting would pick high fees and a high probability of monitoring. In fact a monopolist's profit-maximizing decision, at least under some auxiliary assumptions, is to choose $\pi = \phi = 1$. Competition, on the other hand, would cause rival insurers to bid their insurance and monitoring offers down to the efficient policy.

One key to the efficiency result in this section is the consolidated budget constraints the regulators face. That is, each regulator is both an insurer and an examiner of its banks, and neither can draw on other sources of funds to cover any of its costs. With this assumption, the so-called "race-to-the-bottom" characteristic, by which regulatory competition leads to too little regulation (too little monitoring) cannot be an equilibrium result. From the status quo of $(\widehat{\pi}, \widehat{\phi})$ with regulators splitting the industry, the only way a regulator can attract more banks is by offering a policy that induces all banks to choose the high-risk action. But no such policy can satisfy the consolidated budget constraint.

This is true by the basic assumptions of the model.[6] If all banks choose investments with negative expected value, there are not enough resources in successful banks to cover all the costs of insurance, let alone examination costs. Hence, a race to the bottom will not occur. When a regulator is both an examiner and an insurer of banks, the regulator internalizes the effects of examination policy on the deposit insurance fund.

Of course in the United States, the multiple federal bank regulatory agencies do not each face their own consolidated budget constraints. Instead, the FDIC provides deposit insurance to all banks. It finances this insurance with premiums charged to insured institutions (or more generally, by the maintenance of a fund built up by banks' premium payments). The FDIC finances its regulatory and supervisory costs out of the same revenue source as its insurance. At the same time, the FDIC's financial resources are supplemented by the full faith and credit of the federal government. The Federal Reserve pays for its regulatory activities out of its general revenue from central bank operations. The OCC covers its costs out of a fee charged to the banks it regulates. The next section considers how these differences complicate the interaction among regulators.

5. UNCONSOLIDATED BUDGET CONSTRAINTS

When the financing of deposit insurance and bank regulation are not consolidated, there is a possibility that competition among regulators will lead to undesirable results. The simplest way of examining this possibility is to assume that deposit insurance is financed out of general government revenues, while regulatory agencies cover their examination costs, and the costs associated with the early closure of banks, from the fees they charge. In this case, a regulator's budget constraint, assuming incentive compatibility, is

$$p_1\pi \geq \phi c_a.$$

For a policy such that the incentive constraint is not satisfied, the budget constraint is

$$p_0\pi \geq \phi(c_a + l),$$

where l is the resource cost of closing a bank that is examined and found to have taken action a_0. These two constraints are shown in Figure 3 as B^u and A^u respectively.

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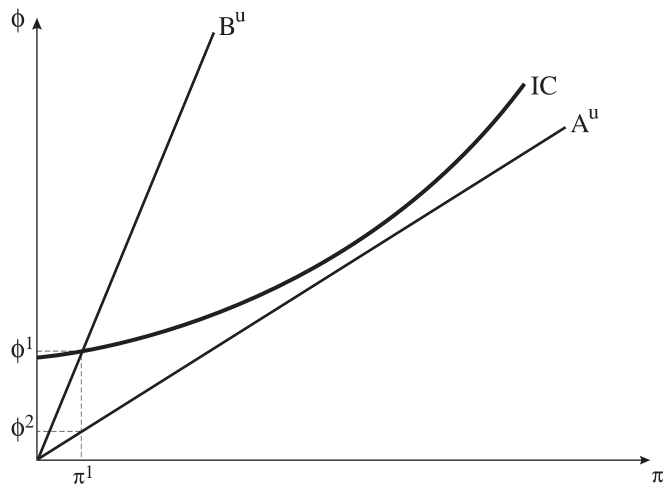
[6] The key assumption here is that a_0 represents an investment with a negative net present value. However, if a_0 were a positive net-present-value investment but dominated by a_1, the efficient policy result would still hold. With all banks taking a_0, π would have to be large in order to satisfy the consolidated budget constraint, making it impossible to choose a (π, ϕ) that banks prefer to $(\widehat{\pi}, \widehat{\phi})$.

Figure 3 Unconsolidated Budget Constraints



Notes: This figure shows the budget constraints for a regulator that only covers examination costs out of fees charged. If all banks take action a_1 the budget constraint is B^u. If high-risk banks take a_0 while low-risk banks take a_1, then the budget constraint is given by A^u. The incentive constraint is IC. If regulators' distaste for risk taking by banks outweighs their desire to attract client banks, then the equilibrium policy is (π^1, ϕ^1). If regulators desire to compete for clients is stronger, then the policy (π^1,ϕ^2) will bid clients away from a regulator offering (π^1,ϕ^1).

This section considers the simplest case of a single type of bank (a single θ-type) and regulators whose objective is narrow and parochial. That is, each regulator simply seeks to maximize its turf, or the share of the market it regulates. Recall that under these assumptions, when regulators also faced consolidated budget constraints, competition led to efficient policies. Here that is not the case. Note that the efficient policy (π^*, ϕ^*) from Figure 1, because it satisfies the consolidated budget constraint, yields surplus funding to a regulator that only needs to cover examination costs. That is,

$$p_1\pi^* = \phi^* c_a + (1 - p_1) > \phi^* c_a.$$

Now consider the policy (π^1, ϕ^1). This is the lowest cost policy that induces banks to choose a_1 and covers examination costs. This policy cannot be an equilibrium when regulators care only about the size of their turf. The policy (π^1, ϕ^2) will be strictly preferred by all banks, because it allows them the opportunity to gamble for the large return, θ. Among policies that induce banks to choose a_0, however, regulators will continue to bid for banks by reducing π (moving along A^u). Hence, with this specification of objectives and budget constraints there is a tendency for the regulatory process to unravel altogether, resulting in an equilibrium with no examination ($\phi = 0$) and no fee charged to banks by regulators ($\pi = 0$). In the absence of any external constraint on regulators' discretion, the agencies have no incentive to engage in more than minimal regulatory activities. This case, then, represents the so-called "race to the bottom."

Now suppose that conservativeness, as specified in earlier sections, is also a part of the regulators' objectives. The previous subsection argued that a regulator with such a mix of motives might be willing to loosen regulation in a way that induces only a small number of banks to take action a_0. With only a single type of bank, however, a regulator is less likely to choose a policy that causes *all* banks to take a_0, even if doing so attracts many more banks to that regulator. This logic leads to an equilibrium policy of (π^1, ϕ^1), assuming that there is no separate fee assessment for deposit insurance. While this policy preserves banks' incentives to take the efficient action, it requires a net subsidy to the combined activities of insurance and regulation.

With consolidated budget constraints, regulators directly internalize the effect of regulatory actions on deposit insurance exposure. This automatic connection is lost when regulation and insurance are separately funded. This separation creates a sort of artificial externality that has an effect similar to the externalities that can interfere with the Tiebout result of efficient policies under competition among local governments.

6. SUMMARY AND CONCLUDING REMARKS

The preceding sections presented a model in which the key function of bank regulation is the monitoring of the investment choices made by insured banks. The model predicts policy choices by regulators that depend on the structure of the banking industry (captured by the distribution of bank types), regulators' objectives, and the financing of bank regulation and deposit insurance (captured by the regulators' budget constraints). The key findings of the analysis are: 1) a single regulator facing a consolidated budget constraint and a homogeneous banking industry will typically choose an efficient policy; 2) if there are multiple bank types with a small number of particularly high-risk banks, a single regulator with conservative preferences toward bank risk taking may choose an excessively strict policy; 3) with consolidated budget constraints for all regulators, competition for "turf" among multiple regulators can lead to efficient policies; and 4) competition for turf among regulators whose budget constraints only cover examination costs (and not insurance costs) leads to a "race to the bottom."

The previous section's simple specification of unconsolidated budget constraints still does not match the actual organization and financing of bank deposit insurance and regulation in the United States. Most notably, one of the agencies—the FDIC—finances both insurance for all banks and regulation for its banks out of the "fees" it charges to all banks. Further, by choosing to be regulated by the OCC or the Fed, however, a bank does not reduce the fees that it pays to the FDIC for insurance. Accordingly, the way in which fees enter into banks' choices of regulators is more complicated in reality than in this article's model. Still, since the financing of insurance and regulation is separated for all other banks other than those regulated by the FDIC, the budgetary externality discussed in this article is present.

Many other characteristics of actual bank regulation have also been left out of the analysis. Rather than presenting a richly detailed description of actual regulatory institutions, this article's intent was to present a simple analytical framework for thinking about the interaction among alternative regulators. In spite of the inherent over simplification, the basic results of this article's analysis are likely to carry over to more complex environments. Competitive interaction among regulators can have beneficial effects, but the separation of the financing of insurance and regulation can make those benefits less certain.

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