Limited Commitment and Central Bank Lending

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Central bank lending is widely regarded as a vital part of the public safety net supporting the stability of the banking system and financial markets. An independent central bank can provide liquidity to financial institutions on very short notice.[1] Indeed, central bank lending has been a prominent part of regulatory assistance to troubled financial institutions in recent years. The idea of a central bank as lender of last resort, however, has been around at least since Walter Bagehot wrote about it over 100 years ago.[2]

For most of that time it was taken for granted that central bank lending had benefits with little or no cost. In the past decade, that view has been challenged. For instance, in the United States the Federal Deposit Insurance Corporation Improvement Act (FDICIA) of 1991 recognized that Federal Reserve lending to undercapitalized banks has the potential to impose higher resolution costs on the Federal Deposit Insurance Corporation (FDIC). More recently, the idea that lending by the International Monetary Fund has led to increased risk-taking in international financial markets is being taken seriously by financial market

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[1] Because a central bank can create money, it has the option of financing lending with an increase in the money supply. We would call such lending a combination of monetary policy and credit policy. When we speak of central bank lending in this article, however, we confine ourselves to pure credit policy. Pure central bank credit policy finances loans with proceeds from the sale of securities (Goodfriend and King 1988).

[2] See Humphrey and Keleher (1984).

participants and policymakers alike.[3] In the United States, financial economists have acknowledged "moral hazard" to be a problem for government financial guarantees ever since the savings and loan crisis of the 1980s.

In this article we look at central bank lending in light of the concerns about moral hazard. Our aim is a practical one: we present principles to help guide central bank lending. Our approach builds on the observation that central bank lending is a publicly provided line of credit. Commercial lines of credit and central bank lending are similar in that both provide substantial funding on very short notice.

Line-of-credit products are complex. We use recent advances in the theory of financial contracts to interpret the structure of loan commitments. By dissecting the incentive implications of the contractual obligations and rights involved in credit lines, we appreciate the tensions present in line-of-credit relationships. In particular, we see how contract terms control the ex post incentives of the borrower and the lender under limited commitment to assure that the line-of-credit product is efficient. We then employ our understanding of these issues to benchmark and inform our analysis of central bank lending.

The nature of the problem is this: A line-of-credit product is designed to meet the current obligations of a firm when it is judged to be illiquid though solvent. Inevitably, then, a loan commitment shifts potential losses from short- to longer-term claimants. For instance, a commercial bank's line of credit to an ordinary business has the potential to shift losses to the borrowing firm's long-term bondholders and residual claimants. Analogously, a central bank's line of credit has the potential to shift losses from uninsured creditors to the deposit insurance fund or general taxpayers. Likewise, lending by the International Monetary Fund to finance a country's balance-of-payments deficit has the potential to shift losses from short-term creditors of that country to the country's taxpayers.[4]

Private line-of-credit agreements, together with the firm's capital structure, balance the liquidation costs of a conservative lending policy against the moral hazard associated with more liberal lending. Covenant provisions in line-of-credit agreements give private lenders the ability and the incentive to constrain credit to insolvent firms when appropriate. In contrast, central banks appear to lack explicit institutional mechanisms to credibly precommit to limit lending. An excessively liberal central bank line of credit makes short-term capital more inclined to move in the direction of favorable yield differentials irrespective

[3] Strictly speaking the International Monetary Fund is not a central bank since it does not have the power to create money. Nevertheless, it is financially a relatively independent governmental organization, and it does make large loans on relatively short notice to countries in financial distress (Masson and Mussa 1995).

[4] Some dilution of long-term claimants is desirable, however, to avoid socially inefficient liquidation (Diamond 1993).

of the risk involved, with the idea that the credit line could finance a quick withdrawal.

The inability to commit to limit lending is the principal weakness of central bank lending policy. The problem is that central banks responsible for the stability of the financial system are inclined to lend whenever not lending could plausibly trigger a systemic crisis. That inclination encourages both domestic and international "hot money" investments—short-term investments that implicitly rely on central bank liquidity support for repayment in the event of a crisis—and thereby increases the scope for violent reversals and flights to safety whenever the market begins to doubt central bank lending intentions. We are agnostic about whether there is a welfare-enhancing role for central bank lending. The critical policy problem is how to limit central bank lending to socially appropriate circumstances.

The article proceeds as follows. Section 1 contains a description of the structure and mechanics of private lines of credit. In Section 2, central bank lending is characterized as a line of credit and the line-of-credit analogy is exploited to identify the nature and source of the undesirable consequences of lending by central banks. In Section 3, we consider how well some actual and possible components of central bank lending policy cope with the problem of limited commitment. We conclude that no simple institutional mechanisms could confidently precommit a central bank to limit its lending. Reasoning by analogy to the historical reduction of inflation, we argue that the only way for a central bank to credibly limit lending is for it to build up a reputation over time for lending restraint. Exploiting the inflation analogy further, we describe a sequence of events that we think will be necessary for a central bank to successfully acquire such a reputation.

1. THE ECONOMICS OF PRIVATE LINES OF CREDIT

The parallel between central bank lending and private lending under lines of credit is illuminating for the similarities and the differences that emerge (Goodfriend and King 1988). Both involve lending large amounts on short notice. However, private credit lines are explicit contractual commitments, while a central bank's commitment to lend is a matter of policy choice. In this section we review the economics of private lines of credit. We will focus in particular on what determines the contingencies under which private banks deny credit.

The Line of Credit Product

Lines of credit (loan commitments) specify a maximum amount that can be borrowed and a formula that determines the interest rate on advances, or "take-downs." Borrowing rates are usually set as a fixed markup over a reference rate such as the LIBOR or the lending bank's prime rate. Borrowers pay

an up-front fee when the line of credit is initiated, as well as an annual "commitment fee" proportional to either the undrawn portion or the entire amount of the commitment (Crane 1973, Schockley 1995). Line-of-credit lending is generally secured by collateral, although the largest and most creditworthy borrowers can obtain unsecured loan commitments. Some loan commitments provide "back-up" support for commercial paper issued by the firm; the loan is drawn down in the event that the firm cannot roll over its maturing paper. In this case the line of credit provides a bank guarantee for the liquidity of the commercial paper issued by the firm, assuring holders of an orderly exit in adverse circumstances (Calomiris 1998).

Loan commitment agreements contain covenants that place restrictions on the borrower's future financial condition. If the borrower violates one of the covenants, the lender has the right (though not the obligation) to terminate the agreement and demand immediate repayment. Some covenants utilize specific financial indicators—minimum net worth, minimum working capital, or maximum leverage ratio, for example. Other covenants restrict the disposition of assets or the issuance of other debt.

Loan commitment agreements also generally contain a clause that allows the bank to declare a default in the event of any "materially adverse change in the financial condition of the borrower." This ambiguously worded clause provides a backstop to the other formal covenants, allowing the lender to terminate lending when the borrower's financial condition deteriorates, even if the specific covenants are technically satisfied. At the same time, a borrower that is in good financial health can be assured that the bank is still obligated to lend.

Because the markup does not vary with subsequent changes in the borrower's creditworthiness, the line of credit represents an implicit insurance arrangement—a credit risk derivative. The implicit ex post insurance payout in a given state of the world is the present value of the difference between the contractual markup and the risk premium appropriate to that borrower in that state of the world. The contract does not provide full insurance, however, because the bank can limit large payouts by invoking covenants and denying credit. This partial insurance is valuable to borrowers as a way of smoothing the cost of contingent funding across various states of the world. Without a line of credit, the firm would pay a high risk premium if it needed funds when creditworthiness had deteriorated. With a line of credit, the firm pays ex ante fees and agrees to the possibility that credit is denied in some states in order to assure ex post access to funds at a lower risk premium. The ex ante fees compensate the bank for the implicit insurance provided.

Lines of credit tend to be provided by financial intermediaries, in general, and banks, in particular. By diversifying over a large number of risks that are to some degree independent, banks can offer insurance-like products at low cost. Bank loan officers specialize in evaluating creditworthiness, and are ideally

suited to monitor the borrower's condition over the life of the commitment. Such information gathering, built up through repeated interactions with the borrower, is crucial in evaluating later requests by the borrower to take down credit. In addition, bank monitoring activities save costs for other creditors. Historically, lending and related credit evaluation activities often have been combined with the issue of demand deposits (Goodfriend 1991, Nakamura 1993). Because of these advantages, banking institutions have traditionally dominated the line-of-credit business.

Agency Problems

Modern theory explains financial contracts as the result of ex ante negotiation among contracting parties in the context of competition from alternative borrowers and lenders. Contractual provisions help control agency problems—adverse incentives that may arise due to asymmetric information during the course of a contractual relationship. Bargaining is presumed to lead to contractual arrangements that are efficient in the sense that no other feasible contracts would make one party better off without making some other party worse off. Competition ensures that no contracting party is worse off than it would be if it contracted with another party instead.[5]

When banks lend to commercial firms, the critical agency problem is managerial moral hazard. Many managerial actions are difficult or impossible to specify as explicit conditions of the contract, either because they are not easily verifiable by the lender or a court, or because their complexity makes them too costly to include. Continuing to operate the business often yields private benefits to the manager-borrower, known as "control rents," which are impossible to transfer to outsiders. The manager may have significant human capital tied to the existing organization and operation, the value of which might be lost or diminished in a closure or liquidation. Also, the manager may enjoy perquisites from controlling the cash flow of the firm. More fundamentally, inducing the manager to take actions that benefit the firm might require giving the manager a pecuniary interest in the firm's profits. Borrowers and lenders may in some circumstances have conflicting interests over such actions. When the net worth of the firm is low, the manager's interest in the continuation of the firm strongly resembles an option; the manager would reap much of the upside gain in the business, while the costs of a deterioration would affect mainly the creditors. The manager can have a distorted incentive to make "all-or-nothing" gambles on excessively risky prospects.

If left unchecked, the moral hazard problem at a firm tends to grow over time. Losses erode net worth to the point where risk incentives shift. The firm begins to seek out investments with large potential payoffs, hoping to gamble

[5] See Harris and Raviv (1991, 1992) for surveys of the financial contracting literature.

its way back to health. The cost of such investments is below-normal rates of return under conditions in which the large payoffs are not realized. As a result, net worth is most likely to erode further, exacerbating the moral hazard problem. Each round of losses further strengthens risk-taking incentives.

Moral hazard can involve more than just the borrower. Other creditors will adopt a strategy that depends on the behavior of the firm's line-of-credit provider. If a lender pulls a line of credit that backs up a commercial paper program in a situation in which the borrower does not have the funds to roll over maturing claims, the firm defaults and investors may take a loss. The rate of return on the commercial paper will therefore reflect market expectations about the future funding behavior of the lender. Overly lax lending policy will show up as an inappropriately small risk premium on the firm's commercial paper or as an overly generous willingness to lend on the part of private investors. This issue is crucial for firms with illiquid assets that wish to issue liquid liabilities, because their creditors will be particularly concerned about prospects for future liquidity. A lender who is confident of the solvency of the firm will be willing to lend, while a lender who believes that the firm is insolvent will likely withdraw funds.

At the time the lending contract is negotiated, the contracting parties will anticipate the agency problems that could arise. Financial contracts deal with agency problems in two ways. First, contractual conditions explicitly constrain a manager's decisions. Such constraints show up in lending agreements as loan covenants, which we discuss in detail below. Second, contractual provisions affect the contingencies which force a change in control that removes the manager of the firm from a decision-making role. Liquidation is a leading example; the firm's tangible assets are sold and the proceeds are distributed to creditors. A "reorganization" supervised by a bankruptcy court is another type of change in control; management is often removed, but even when it remains in place its decisions are sharply constrained while the firm is under court-sponsored supervision.

Changes in control serve three purposes in the context of the agency problems that afflict lending arrangements. First, removing existing management prevents further value-wasting actions. Second, separating management from the quasi-rents associated with controlling the firm acts as a pecuniary punishment that helps provide ex ante incentives to manage the firm faithfully. Third, control changes facilitate restructuring the firm's liabilities in order to realign them with changed circumstances and allow repayment of creditors that wish to terminate their relationship with the firm.

Liquidation will be efficient ex post if it maximizes the total value of the firm. Inefficient liquidation—selling the firm's assets for less than the value of the firm as a going concern—reduces the total expected value of the firm when it occurs, and thus reduces the ex ante expected value of the firm. Ex ante both parties will prefer provisions that reduce the likelihood of inefficient

ex post liquidation. On the other hand, managerial control rents are extinguished when the firm is liquidated. The loss of these rents is a social cost of liquidation. Since control rents can only accrue to the managers, lenders will not take them into account in deciding when to liquidate. The cost of transferring control rights to lenders is that they will want to liquidate too often—when liquidation value exceeds the value as an ongoing concern, excluding control rents. Efficient liquidation rules balance the benefit of control changes against the cost of inefficient liquidation (Diamond 1993).

Credible Commitments

The circumstances under which control changes take place are determined by contractual terms (as well as the implicit background rules embodied in the relevant legal codes) that determine the assignment of property rights under various contingencies. The borrower and the lender will have an incentive ex ante to design contractual provisions so that ex post decisions about liquidation and the allocation of control rights are efficient, in the sense that they maximize the expected ongoing value of the concern as a whole, subject to the constraints imposed by the agency problems they face.[6] Loan covenants and collateral provisions play a central role in structuring the ex post incentives to effect control changes under line-of-credit arrangements.

Loan Covenants

Under the conditions defined in the covenants, the lender has the right to withdraw funding. If the borrower cannot obtain funding elsewhere, as is likely (see discussion below), the lender can essentially force reorganization or liquidation. Absent violation of the covenants, the borrower retains control of the firm. Loan covenants thus can be viewed as a means for conditionally transferring control of the reorganization/liquidation decision to the lender. Covenants also control other forms of ex post moral hazard directly by limiting the manager's right to take on new risks, change lines of business, assume new indebtedness, and so on (Aghion and Bolton 1992, Berlin and Mester 1992).

Loan covenants can be quite strong. In practice, however, the violation of a loan covenant is merely an occasion for renegotiation between lender and borrower. The lender can waive the violation or use the ability to declare (technical) default as leverage to obtain more favorable monetary terms or more stringent covenant conditions (a partial control transfer). Renegotiation allows outcomes to vary with ex post contingencies in ways that would be difficult to provide for ahead of time in a formal contract (Huberman and Kahn 1988, Kahn and Huberman 1989). Strict covenant restrictions can be adopted, with the expectation that in some circumstances they will be waived or loosened by

[6] Not all control changes are instigated by lenders; they can also take place at the initiative of the firm's governing board, presumably representing the interests of shareholders.

the lender. Although the borrower and the lender cannot precommit to refrain from renegotiating, the loan agreement can influence outcomes by ensuring that the allocation of property rights depends on future circumstances.

It makes sense, from an ex ante point of view, for the allocation of bargaining rights implied by loan covenants to depend on the riskiness of increased lending. When covenants are violated, managerial moral hazard is likely to be more pronounced. If further lending is to take place, the lender must do as well as if it withdrew the credit line and forced reorganization or liquidation. In this case covenants put the lender in a position to insist on a higher markup or more collateral to compensate for the heightened risk of continued lending. If the lender cannot be satisfied—if no such terms or collateral exist—then further lending is, presumably, ex post inefficient or infeasible, and the borrower is insolvent. When covenants are fully satisfied, managerial moral hazard is likely to be muted and so the lender does not need the right to prevent further lending. The bargaining power rests with the borrower, who is quite likely to be solvent in this case. Lending takes place at the borrower's request at the pre-agreed rate. The ex post self-interest of lenders, the ability to renegotiate, and the presence of relatively strict loan covenants provide a contractual mechanism that credibly commits the lender to limit lending when appropriate.

If given the choice ex post, the lender would never want to extend new lending to an insolvent firm. A firm is insolvent when the present discounted value of future cash flows falls short of the real current value of liabilities. Without a positive gap between future receipts and future obligations, the present value of anticipated future repayment streams cannot possibly cover the value of additional loans. Lending in such circumstances would represent subsidization, and a profit-maximizing lender has no reason to subsidize customers under competitive conditions.[7]

Collateral

The secured lender's ability to seize collateral for nonpayment is an important contractual right. A lien on an asset that is essential to the borrower's operations can provide the lender with another means of forcing the borrower's liquidation. In addition, collateral reduces the lender's risk by providing compensation when the borrower cannot pay the obligation in cash, therefore allowing a lower risk markup. Collateral also sharpens the borrower's incentive to repay, which helps relax borrowing constraints by allowing larger credible repayment obligations (Lacker 1998). Moreover, in bankruptcy, secured debt has a priority claim on the pledged assets. Collateral thus prevents dilution of the lender's position.

[7] The control rents enjoyed by the manager should, strictly speaking, be counted as part of the total value of the firm as a going concern, but since (by definition) these rents cannot be pledged to outsiders, they are irrelevant to financing decisions.

The lender's ability to take new assets as collateral later in the lending relationship helps overcome the classic underinvestment problem associated with debt overhang (Stulz and Johnson 1985). When the value of the firm is below the nominal value of outstanding debt, part of the return to any investment accrues to current debtholders; the real value of their debt increases. By pledging collateral, the borrower and the new lender can appropriate and share between them much of the gains from the new investment. Junior lenders can prohibit financing new projects with secured debt by including a "negative pledge clause" that prohibits pledging collateral to other lenders. Many junior creditors do not do so, however, since a negative pledge clause has the potential to prevent value-enhancing investments. For many publicly issued bonds, the firm retains the right to finance new projects with secured debt. Note that the presence or absence of a negative pledge clause for junior debt is a matter of contract. Note also that the lender's decision to take additional collateral is subject to ex post rationality constraints; it must be in the lender's self-interest to do so.

It is important to recognize that collateralized lending is not perfectly safe. The value realized by seizing and disposing of collateral is uncertain, and in some circumstances can fall short of the nominal obligation it backs. This feature is no accident, since borrowers have a greater incentive to default and surrender collateral when its value has fallen below the value of the debt. Why would lenders agree to terms under which they may take a loss on collateral? As previously noted, the key role of collateralized debt is to enhance the repayment incentive of the borrower. Collateral that is worth more to the borrower than to the lender, perhaps because of the transactions costs associated with liquidating the collateral, can provide adequate repayment incentives even though the lender suffers a loss when the borrower defaults and transfers the collateral (Lacker 1998). Moreover, collateralization alters ex post bargaining positions in any renegotiation by the borrower and the lender.

Monitoring

As mentioned above, line-of-credit lending is accompanied by costly information gathering. Banks assess the borrower's credit risk prior to the contractual commitment in order to set contract prices appropriately and to screen inappropriate risks. After the lending commitment has been signed, ongoing monitoring takes place, partly in the form of periodic financial statements required by covenant, and partly through informal contacts. Note that any arbitrary information gathering can, in principle, be negotiated as part of the commitment agreement. For example, many agreements stipulate that the lender receive audited financial reports. In other cases, particularly for small firms, the burden of audited statements is judged too costly and unaudited reports are accepted instead. When the borrower and the lender negotiate the monitoring features of

the contract, they presumably balance the marginal value of gathering additional information against the expected incremental joint cost.

Lenders have a strong incentive to gather information on an ongoing basis in order to be able to assess the solvency of the borrower as accurately as possible. Periodic monitoring thus helps prepare the lender to make critical decisions when the borrower experiences financial distress (Rajan and Winton 1995). What is learned about the characteristics of the firm's cash flow can help the lender interpret payment problems and more accurately assess the value of the firm as a going concern. Such information will be useful when the lender decides whether to extend or deny credit in response to covenant violations. In comparison, a lender with no prior lending relationship with the borrower will be at a distinct informational disadvantage.

Information gathering gives rise to "relationship lending" in which ties between lenders and borrowers are typically long lasting (Berger and Udell 1995, Petersen and Rajan 1994, Petersen and Rajan 1995, and Sharpe 1990).[8] This effect is particularly acute in times of distress, when outsiders are unable to acquire information fast enough to assist the firm on the same terms. The informational hurdles facing alternative lenders make the current lender's decision to grant or deny credit all the more crucial. When the informational advantage of a lending relationship enables a firm to obtain funds at a low enough cost to continue operating, and that same firm would have been unable to obtain funds cheaply enough without that relationship, we can say that the firm is illiquid though solvent. Withdrawing credit in this setting can effectively force reorganization or liquidation.

Safeguards for the Borrower

From the borrower's point of view, the important feature of loan covenants is that they define the limits of the lender's power to abrogate the agreement and demand accelerated payment. If the covenants are not violated, the lender is compelled to lend. As the lending relationship matures over time, the quasi-rents associated with the lender's informational advantage over competing lenders will grow. If the lender had blanket authority to demand repayment, the lender would be tempted to extort concessions from even a financially healthy borrower. All the quasi-rents from the relationship would inevitably accrue to the lender. To safeguard the borrower against such opportunistic behavior, the line-of-credit agreement stipulates that the lender is compelled to lend at a pre-agreed risk premium, absent any violation of the covenant conditions.

To summarize, then, line-of-credit agreements are crafted to address anticipated moral hazard problems that may arise if the borrower later gets into

[8] Relationship lending can also arise outside of formal line-of-credit lending.

trouble. In the presence of loan covenants and collateral provisions, a lender's profit motive allows it to credibly commit to making appropriate decisions to withdraw credit and induce closure or reorganization. Costly periodic monitoring enhances the lender's ability to gauge the borrower's situation.

2. CENTRAL BANK LENDING AS A LINE OF CREDIT

In this section we describe the similarities and differences between central bank lending and lending under private loan commitments. We consider central bank lending practices against the benchmark of private lending mechanisms, without prejudging the usefulness of public line-of-credit lending.[9] The critical difference is that the profit motive provides private line-of-credit lenders with ample incentive to limit lending ex post in the event of borrower adversity. The comparable incentive for central banks is relatively weak. Indeed, the commitment problem facing a central bank is the opposite of that facing a private lender; a lender needs to commit to lend in situations in which it might *not want* to lend, while a central bank needs to forego lending when it might *want* to lend.

Central Bank Lending

At first glance, central bank lending would appear to be quite different from private line-of-credit lending. Central banks do not generally negotiate contractual terms with individual borrowers. Instead, they are given statutory authority to lend to broad classes of institutions. Central banks are publicly chartered institutions and, unlike private lenders, profit maximization is not their primary objective.

Despite these apparent differences, central bank lending functions in fundamentally the same way as a private line of credit—by providing guaranteed access to borrowed funds at a predetermined rate. The rate at which central banks lend is generally posted in advance rather than negotiated ex post with each individual borrower. Thus central bank lending rates do not appear to vary much with the borrower's ex post creditworthiness. At times, distressed borrowers turn to the central bank because terms offered by private lenders would be exorbitant, either in the cost of explicit financing or because the terms would require surrender of control. Access to central bank credit therefore appears to provide implicit insurance to those that qualify. One difference between the pricing of central bank credit and private lines of credit is that central banks generally do not charge explicit ex ante fees for the service, although one could

[9] See Goodhart (1988) and Schwartz (1992) for alternative views on the desirability of central bank lending.

argue that the central bank commitment is bundled together with an array of regulatory burdens (and privileges).[10]

In its classic rationale, central bank lending is intended to help illiquid but solvent financial institutions meet their maturing short-term obligations. In the extreme case, central bank lending might fund a run on demand deposits. Note that this function closely parallels the role of bank lines of credit in backing up commercial paper programs. The facility is designed to help a firm cope with an emergency "run"—an inability to roll over its credits. As noted above, a decision to withdraw credit can trigger default on the commercial paper and closure or reorganization of a firm.

Compare private and central bank lending with respect to the mechanism that links credit withdrawal and closure. A private lender denies credit, causing a default, which leads creditors to seek remedies by seizing assets. The borrower files for bankruptcy to obtain protection from creditors so that a division of the losses can be negotiated without destroying firm value. A central bank that denies credit to a bank forces the hand of the chartering agency or the deposit insurance fund. The central bank's critical role in bank closure brings it face-to-face with the government agencies that have direct responsibility for closing banks.

Agency Problems

A vast array of bank management decisions involves risk-return trade-offs. Attitudes toward risk are to some degree distorted at any leveraged entity, because some decisions affect the value of debtholders' claims. Banks are among the most highly leveraged of institutions. At well-capitalized banks, the value of future control-rents is an asset that acts as an implicit performance bond that offsets risk-taking incentives. When net worth falls, however, the value of the implicit bond vanishes and incentives flip toward risk-taking—little is left to lose. It is widely recognized that the management of a poorly capitalized bank has incentives to take on excessive risks in an attempt to gamble its way out of trouble. When supervisory restraint is lax—as during the U.S. savings and loan crisis, or in the recent emerging markets banking crises—moral hazard steadily grows as the losses pile up (Calomiris 1998).

Private banks make explicit case-by-case decisions to grant lines of credit. In contrast, central bank lending commitments are not usually made on an individual basis. Often legislative and regulatory policies delimit the set of institutions that have access to central bank credit. Sometimes the set of

[10] See Kwast and Passmore (1997) for evidence on the net subsidy provided by the financial safety net in the United States.

institutions with access is quite large.[11] The key difference is that private institutions are able to condition the commitment on an examination of the prospective borrower's financial health and then tailor the contractual terms to the individual borrower. In contrast, access to central bank credit is granted to broad categories of institutions. Also, the terms of central bank lending do not reflect the competitive discipline of arm's-length bargaining.

Central bank supervision of institutions with access to central bank credit is a direct counterpart to the ongoing monitoring performed by banks. Supervisory reports, like the periodic financial statements provided to line-of-credit lenders, keep authorities apprised of changes in the creditworthiness of the prospective borrower. Even for central banks without a direct supervisory role, access to such information performs the same function. Supervisory information is generally far more detailed than the reporting required of private line-of-credit customers. As noted earlier, private contracts can, in principle, mandate stricter disclosure, but there are impediments to doing so. In the United States, provisions of bankruptcy law discourage lenders from becoming so intimate with the management of the firm as to be deemed an "insider" (Baird 1993).

Like private line-of-credit lending, central bank lending is generally collateralized. Specific assets can be documented and evaluated in advance, drawing on the central bank's supervisory knowledge. In addition, the security interests of central banks are generally favored in bank failure resolutions. This fact tends to make central bank lending relatively safe, although, as noted above, collateralized lending is not risk-free in general.

When central banks lend to government-insured institutions, collateral plays a crucial role in the loan's effect on the insurance fund in the event of a failure. Collateralized lending dilutes junior claimants, which in the case of an insured bank includes depositors. The insurance fund stands in for the depositors in the event of closure, however, so central bank lending effectively dilutes the deposit insurance fund. For example, in the United States, the FDIC assumes the failed bank's indebtedness to the Federal Reserve and in exchange retains the pledged assets. When the Fed lends to allow a failing bank to pay maturing short-term obligations the insurance fund retains the collateral, but the maturing short-term obligations have been replaced by a fixed obligation to the Fed. If the short-term claimants whose funds were withdrawn are insured depositors, the operation has merely replaced one fixed obligation for another. It is a different matter, however, if some short-term claimants are uninsured. The

[11] In the United States, for example, all depository institutions that are subject to reserve requirements are eligible to borrow at the Federal Reserve's discount window. In addition, Section 13 of the Federal Reserve Act allows the Board of Governors to authorize the Reserve Banks "in unusual and exigent circumstances" to extend credit to any individual, partnership, or corporation, provided the Reserve Bank obtains evidence that such entity "is unable to secure adequate credit accommodations from other banking institutions."

short-term claimants would have shared in the losses with the FDIC had the central bank not lent.[12] Instead, the insurance fund inherits a bank in which an uninsured claim held by the private sector is replaced by a fixed senior claim held by the Federal Reserve. In the process, closure is delayed and private uninsured creditors are spared.

The Commitment Problem

With private lines of credit, lender profit maximization provides an incentive to advance credit only when it is ex post efficient to do so. The environment surrounding central bank lending is quite different. A central bank has a legislated responsibility for the stability of the financial system as a whole: it could be blamed for any negative consequences of not lending. A central bank that precipitates the demise of one or more financial institutions may be subject to direct action through the legal system or indirect action through the legislature. It is impossible to prove the counterfactual, i.e., that not lending and letting a troubled firm fail would not seriously disrupt markets. Furthermore, it is difficult for outsiders to question, after the fact, a central bank's judgment on such matters. For all of these reasons, central banks are inclined to lend whenever financial stability is at all threatened.

Central banks are careful to protect their loans by taking collateral. In fact, some central banks lend only on terms that virtually guarantee repayment in full. In the United States, for example, discount window loans are virtually always collateralized, assuring priority in closure (Hackley 1973). Moreover, the FDIC generally assumes the debt that the borrowing bank owes the Fed in exchange for the collateral, relieving the Fed of the risk of falling collateral value. This arrangement allows the Reserve Banks to avoid loan losses but has the effect of shifting losses to the deposit insurance agency (Marino and Bennett 1999).

Implicitly restricting central bank lending to be risk-free by taking collateral is a "bright line" policy that is easy to verify ex post. Such a policy is one way to limit central bank involvement in the allocation of credit and to restrict the scope for subsidization. Limits to the central bank's involvement in credit allocation can help buttress the central bank's independence and bolster the fiscal discipline of the deposit insurance fund (Goodfriend 1994). One might think that such a bright-line no-loss policy would sharpen the central bank's incentives, bringing them more closely in line with those of a private line-of-credit provider. By itself, however, taking collateral is not enough, because the central bank then has no pecuniary reason not to lend.

[12] This presumes the current depositor preference regime. In the absence of a depositor preference law, the short-term claimants would have been junior to the FDIC's claim. See Birchler (forthcoming) and Marino and Bennett (1999) for discussion of depositor preference law. Marino and Bennett also discuss the role of Federal Reserve lending in delaying closure of failed banks.

Lending by the central bank creates a potentially severe moral hazard problem. Markets expect the central bank to provide the bank with the funds to allow the exit of uninsured liquid claimholders. Thus, lending by central banks facilitates a reallocation of wealth among the creditors of a failing bank that the deposit insurance fund has neither the capability nor the legal authority to perform by itself. Private lending to a failing firm is subject to the safeguards of bankruptcy law. This includes the fraudulent conveyance provision, which under certain conditions allows the court to unwind transactions, including loan agreements, that occurred immediately prior to bankruptcy if such agreements disadvantaged the bankrupt firm's estate. Collateralized central bank lending accompanied by indemnification from the deposit insurance fund is subject to no such formal discipline, only the vagaries of the political system.[13]

The financial stability mandate can create pressure to expand the scope of central bank lending to nonbank financial institutions. Nonbank financial intermediaries are capable of amassing sizable financial market positions. The liquidation of these positions could be seen as a threat to the stability of asset prices and the solvency of many other financial institutions, including insured banks. A central bank with no formal authority to lend outside a narrowly defined set of institutions is, of course, well positioned to resist influence. Otherwise, we might see a tendency to expand the range of institutions receiving central bank line-of-credit assistance.[14]

We conclude that the incentives for a central bank to limit lending are relatively weak. As a result, we should expect to see a tendency for central banks to overextend lending, creating moral hazard problems among institutions deemed likely to qualify for central bank credit. Moreover, the rate of incidence of financial distress that calls for central bank lending should tend to increase over time as market participants come to understand the range of the central bank's actual (implicit) commitment to lend and adjust expectations accordingly.

3. COPING WITH THE COMMITMENT PROBLEM

To summarize the argument so far, we have seen how commercial banks efficiently and profitably structure contracts to support private lines of credit. They do so because (1) their own money is at stake, (2) they can choose their borrower relationships, (3) the conditions include the right to monitor the value of assets on an ex ante (ongoing) basis to distinguish illiquid from insolvent borrowers in the event of a request for funds, (4) loan covenants give the lender the right to withdraw credit when the borrower's financial condition

[13] For an account of Federal Reserve lending to depository institutions, see U. S. Congress (1991). See also Marino and Bennett (1999).

[14] For an account of Federal Reserve lending to nonbanks, see Garcia (1990).

has deteriorated, and (5) competition and profit maximization induce private providers to balance the risks of accommodating a request for funds against the costs of not lending. To be competitive, the terms of the line-of-credit product must not exploit borrowers; and to be profitable, the credit line must provide a risk-adjusted return comparable to products offered by other banks.

Central banks provide lines of credit under such different circumstances that we cannot presume they will make lending decisions appropriately. First, financial losses are not borne by the central bank but by the Treasury, and, ultimately, taxpayers. Second, a central bank cannot offer "take-it-or-leave-it" conditions because it is responsible for protecting financial markets as a whole and may not be able to refuse to lend to an institution whose failure might threaten the system. Third, for the reason mentioned above, a central bank might feel pressure to lend to an institution that it does not examine thoroughly, or at all. Fourth, a central bank is not disciplined by competition or profit maximization.

At any point in time, then, a central bank will be more inclined to lend whenever not lending could threaten the entire financial system. Such incentives ensure that the central bank carries out its legislative mandate to stabilize financial markets. The problem is that the inclination to lend creates in the public's mind an expectation that a financial institution in a protected class can count on credit assistance from the central bank in certain adverse future circumstances. Private lenders will take advantage of central bank assistance by monitoring less and accepting greater credit risks when lending to implicitly protected firms. Further, borrowing firms in the protected class will take advantage, too, by taking on increasingly risky assets. Over time, the central bank will be inclined to expand the class of firms perceived to be protected and the extent of protection.

The fundamental problem is to find a way to credibly commit to limit lending.[15] It is a difficult problem and there are no easy solutions. In what follows we consider the practical effectiveness of five broad approaches to the commitment problem.

Good Offices Only

In lieu of establishing a practical means of committing a central bank to refrain from lending except in deserving circumstances, we could imagine legislation precluding a central bank from extending its own credit under any circumstances. This possibility is worth considering because a central bank could still play a useful and effective role in facilitating private credit transactions or those of other national or international agencies. A central bank has three institutional

[15] Some question the need for any discount window lending at all. See Goodfriend and King (1988) and Schwartz (1992). Adherents of this view can interpret our analysis as an exploration of the means by which a central bank might limit its lending in practice.

strengths in this regard. First, its financial independence and independence from the budget process makes it impartial with respect to financial matters, unlike most other government agencies, or, for that matter, firms in the private sector. Second, a central bank has a large staff with practical experience in economics, supervision and regulation, payments system operations, and financial law. Third, in the course of carrying out their normal duties, high central bank officials develop personal relationships with their counterparts in the private sector.

Thus, a central bank could offer its "good offices" to help private creditors negotiate a troubled financial firm's recapitalization. The central bank might have knowledge of the troubled firm through existing supervisory relationships. Also it might be in a position to "certify" the solvency of the firm to others, essentially facilitating "due diligence" efforts. Even in the absence of ex ante central bank knowledge of the institution, the central bank might inspect the portfolio for others, acting as a trusted third party. Furthermore, in negotiations among members of a potential lending consortium, the central bank might play the role of neutral arbitrator.

In principle, the extension of good offices need not involve pressure or sweeteners from the central bank. In practice, however, as long as a central bank retains supervisory and regulatory powers, one could not be sure whether private parties to the agreement were influenced implicitly by a concern about punishment should they not sign on to a deal. In effect, then, a deal could have been facilitated by implicitly directed credit allocation because of the central bank's involvement. The parties could also believe that regulatory authorities, including the central bank, would forbear if the institutions that lent became troubled themselves. Of course, a deal could very well involve a considerable transfer of equity from the original owners to the new owners of the troubled firm. If a central bank presides over a deal more favorable to the original owners than they would have received without its help, moral hazard has increased.

One way to ensure that no implicit pressure or sweeteners are involved when a central bank uses its good offices would be to take the central bank out of bank supervision and regulation. But then the central bank would lose the professional and personal connections that make it a good facilitator in the first place. The upshot is that even limiting a central bank's role to one of facilitator tends to create in the public's mind the possibility of assistance of one kind or another.

Lending Hurdles

Recognizing that there are circumstances when central bank lending would be desirable in order to protect the financial system, we consider various hurdles designed to limit the central bank's inclination to lend except in extreme circumstances and to limit its own exposure if it does lend. We deal with these

issues in reverse order. First, we consider the taking of collateral. After that, we consider the effectiveness of hurdles that a central bank might be made to clear before it is authorized to lend in the first place.

Collateral

Some central banks lend only on good collateral to fully protect their funds in the event that the borrower cannot repay. The taking of good collateral certainly protects the financial integrity of central banks themselves. As discussed above, however, collateralized lending does not limit the exposure of the insurance fund and taxpayers.

Its lending well protected, a central bank would have little incentive to precipitate a borrower's insolvency by refusing to lend. When a central bank supervises a borrowing bank, it is in a good position to evaluate the illiquid portions of a portfolio for purposes of collateral and can keep a bank operating for some time. In effect, central bank lending provides uninsured creditors of a troubled bank with free insurance (which encourages uninsured creditors to invest at shorter maturities) and delays the time when a troubled bank would default to one of its creditors and trigger its closing and reorganization. Assets that could have remained in the bank, if it had been closed sooner, are pledged to the central bank and are unavailable to help the deposit insurance fund and the taxpayers pay off insured deposits. Full collateralization of central bank lending conceals the fact that such lending exposes the insurance fund and the taxpayer to a risk of loss.

Early Intervention

One option for better protecting the deposit insurance fund and the taxpayer is to require bank regulators to close a failing bank when its book value equity capital falls to, say, 2 percent rather than to the point of book insolvency. A deterioration of book capital could trigger progressively heavier regulatory restrictions. Such restrictions might prohibit additional central bank lending at some point, unless the highest officials in the government grant written permission to lend.[16]

The problem with this hurdle is that it is based on book rather than market value capital. When depository institutions have assets that are in large part illiquid non-traded loans, they could become insolvent on a market value basis well before they are declared insolvent on a book value basis. For example, consider the Bank of New England which was declared insolvent in January 1991. Soon after, the FDIC released estimates that the deposit insurance claim would cost the taxpayer around $2 billion. Why didn't the regulators act sooner?

[16] The "prompt corrective action" provisions of the FDICIA encourage early closure and help to restrict central bank lending in this way.

The Bank of New England's problems began when the mortgage loans it made in the mid-1980s turned bad. Real estate proved unable to earn a sufficient return to cover the loan payments. The bank, however, still had to pay competitive interest on deposits. So the bank had to divert to depositors a portion of the return on assets that had been going to equity holders. The cut in dividends caused the stock price to fall precipitously, and the bank could not meet the competitive deposit rate payments by reducing dividends alone. The bank had to sell off securities, pledge assets to the Federal Reserve's discount window, and obtain Treasury deposits in order to fund withdrawals of uninsured deposits and pay interest to the remaining depositors. The negative cash flow eventually reduced the book value net worth enough for regulators to seize the bank.

In this case it may be said that regulators were too slow in writing down the value of loans. It is well to remember, however, that there are often good reasons to be cautious. The market value of a loan is the present discounted value of future cash flows. Although current cash flows may be small, there is usually room for disagreement among analysts concerning future cash flows. Therefore, any write-down by a regulator is subjective and subject to challenge ex post by high government officials or by the bank in question itself. As a result, hurdles based on measured capital deficiencies that are designed to protect the deposit insurance fund and the taxpayer against losses due to excessive central bank lending might not work very well in practice.

Constructive Ambiguity

The above argument suggests that one cannot count on simple mechanistic hurdles to limit a central bank's inclination to lend. The problem is that financial markets know that there are circumstances in which a central bank would not refuse to lend to troubled institutions. Thus, owners of institutions that are big enough or central enough to the payments system or to financial markets more generally have an incentive to increase their risk exposure in just those circumstances. Owners know that they keep the upside returns if things go well, but share any losses more broadly, i.e., with the central bank, an insurance fund, or the taxpayer, if things go badly.

This sort of logic puts a central bank in a box. A central banker's willingness to support the financial system in times of potential crisis (to maintain the confidence necessary to facilitate the functioning of financial markets and the economy more broadly) actually causes risks in the system to grow. For this reason, a central bank might be inclined to keep markets guessing about the exact circumstances in which it would be willing to lend. By creating uncertainty in the minds of potential borrowers, such ambiguity might be thought to be constructive because it causes potential borrowers to take on less risk. Constructive ambiguity, under this interpretation, attempts to reduce market

participants' perception of the probability of central bank lending while reserving the central bank's option to lend when systemic concerns seem to require it.

Some ambiguity is unavoidable in any attempt to state the precise contingencies in which a central bank might lend. The true policy would depend on information available to the central bank at a future date, some of which might be private information about specific firms known only to the central bank. A policy that needs to be based on private unpublishable information would not be verifiable and so could not be made completely free of uncertainty and ambiguity. Moreover, lending policies that depend on future circumstances in complicated ways might be difficult to state with clarity in advance.

That said, one might ask whether a central bank might want to deliberately increase the uncertainty surrounding its lending intentions. At one level, ambiguity can be enhanced by not attempting to sharpen or clarify the broad principles of central bank lending in internal discussions or external speeches of high central bank officials. Over time, however, markets will learn the central bank's actual lending policy. If the central bank does not follow through with actions that ratify the announced ambiguity, its rhetoric will ultimately be disregarded. Market expectations will converge on the central bank's actual policy. To be sustainable, therefore, a policy of constructive ambiguity has to be demonstrated in a central bank's lending actions themselves.

In order to increase ambiguity, a central bank would have to add extraneous variability to its lending policy—it would have to play a "mixed strategy" in game-theoretic terms. In effect, a central bank would have to couple each lending decision with a spin of a roulette wheel that would randomly point to "follow through" or "not follow through." The central bank would need to be willing to abide by the wheel. That is, with some probability the central bank would lend when its better judgment said the situation did not call for it; and with some probability the central bank would have to follow the wheel and not lend when it would otherwise wish to do so.

Randomization can be economically useful. For example, tax authorities audit randomly, with audit probabilities that vary with some basic features of the return. Randomization balances the beneficial incentive effects on taxpayer behavior against the expected resource cost of the audits. Tax authorities are able to implement mixed strategies credibly because they have learned over time that failing to audit eventually leads to increased tax evasion.

The problem with adding variability to central bank lending policy is that the central bank would have trouble sticking to it, for the same reason that central banks tend to overextend lending to begin with. An announced policy of constructive ambiguity does nothing to alter the ex post incentives that cause central banks to lend in the first place. In any particular instance the central bank would want to ignore the spin of the wheel.

Constructive ambiguity in the absence of an ability to precommit may actually increase the drift toward expansion. The greater the perceived probability of lending by the central bank in various circumstances, the greater the risk-taking incentive for eligible institutions. Whenever the central bank is seen to lend in a situation in which it had not lent before, perceived probabilities will be revised upward, inducing greater risk-taking.[17]

Extended Supervisory and Regulatory Reach

A central bank could consider extending its supervisory and regulatory authority, or the authority of other government agencies, to all institutions to which it might possibly wish to lend. In principle, such authority would enable the central bank to limit risk-taking directly. A central bank might extend its regulatory authority to financial institutions, banking or otherwise, big enough or central enough to threaten the financial system if they failed.

There are many problems with attempting to control risks by extending regulatory authority. First, regulatory reach does not extend across international borders. An attempt to regulate financial firms too heavily may cause them to locate in those countries willing to impose little regulation in order to attract the business. Second, an attempt to extend regulation within a country causes new institutional forms to develop to escape regulation. Third, the proliferation of new financial instruments associated with derivatives enables institutions to synthesize financial positions in many ways. Sophisticated financial engineering has made circumventing regulatory restrictions much easier. It has become very difficult for regulators to monitor and regulate transactions, i.e., balance sheet and off-balance-sheet positions of a firm. This development prompted the movement from direct supervision of balance sheet items toward a supervisory philosophy focused on institutions' risk management and control processes.

If central banks extend supervisory and regulatory authority to a broader array of financial institutions, they risk a positive feedback effect on central bank lending policy. Supervisory involvement in a financial sector can "taint" government authorities with implicit responsibility for the health of institutions in that sector, heightening the perception that the central bank is willing to lend to them in the event of liquidity problems. A central bank might find it costly to disappoint such expectations. In other words, extending the breadth of supervision and regulation could induce a commensurate extension of the perceived central bank lending commitment.

Supervision and regulation has its place as part of a line-of-credit package, but it is oversold as a means of controlling risk-taking by firms that could

[17] Note that for the tax authority, the fraction of returns that are audited is published and may have far more impact on perceived audit probabilities than an individual audit. In contrast, because the frequency of central bank lending is much lower, individual instances may have a far greater effect on market expectations of future lending.

potentially benefit from having access to central bank lending on favorable terms.

Reputation Building

In our view, none of the above institutional mechanisms can credibly commit a central bank to limit its lending or prevent increased risk-taking induced by a central bank's inability to limit its lending commitment. However, we believe that a central bank could credibly commit to limit its lending by building a reputation for doing so. Given the pressures that a central bank faces, there might seem to be little hope that it could ever build a reputation for lending restraint. It is difficult to imagine how a central bank would begin to do so. Yet, we think that the experience by which central banks around the world have built a reputation for maintaining low inflation provides a road map for how they might credibly commit to limit lending.

Building a Reputation for Low Inflation[18]

In the 1960s, the inflation that accompanied stimulative monetary policy was tolerated as a necessary evil in the United States because it seemed consistent with a stable Phillips curve tradeoff between unemployment and inflation. In retrospect, however, we see that workers and firms came to anticipate deliberately expansionary monetary policy. Workers learned to take advantage of tight labor markets to make higher wage demands, and firms took advantage of tight product markets to pass along higher costs in higher prices. Increasingly aggressive wage and price behavior tended to neutralize the favorable employment effects of expansionary monetary policy, and the Federal Reserve became evermore expansionary in pursuit of low unemployment.

In the 1970s, disaffection with inflationary policy arose as the Phillips curve correlation broke down and both inflation and unemployment moved higher. In the late 1960s, the Fed began periodically to try to brake the acceleration of inflation with tight monetary policy, well aware that such policy actions caused unemployment to rise. The resulting stop/go monetary policy characterized the period from the mid-'60s until the early 1980s. Finally, the great disinflation introduced a period in which the Federal Reserve gradually acquired credibility for low inflation.

Two developments paved the way for the great disinflation. First was the progress that economists made in understanding the causes of inflation. This professional understanding reinforced the Fed's confidence that monetary policy could bring inflation down. Second, two decades of nonmonetary approaches

[18] This account is drawn from Goodfriend (1997).

to controlling inflation—for example, wage/price guidelines and controls, fiscal budget policy, and credit controls—had been tried and had failed.

By the time Paul Volcker became Federal Reserve Chairman in 1979, inflationary policy was widely recognized to have costs with no offsetting benefits. Previous experience with stop/go policy made clear that bringing inflation down would be costly too. Indeed, the inflation was not broken until a sustained tightening of monetary policy that began in 1981 created a serious recession that tested the Federal Reserve's determination and the public's support. With widespread public support, the Federal Reserve has maintained low inflation for almost two decades. Macroeconomic performance has been good compared to that of the inflationary period, and only one mild recession has occurred thus far—in 1990 to 1991.

Building a Reputation for Limited Lending

The analogy to the historical reduction of inflation provides a road map for a central bank that seeks to acquire a reputation for lending restraint. We might imagine the following sequence of events. Initially, the central bank and the public alike recognize only the short-term benefits of central bank lending. Central banks are inclined to extend emergency credit assistance to any institution whose possible failure could present even the most remote risk of disruption to the financial system. The liberal lending policy encourages potential beneficiary firms to take on more risks. Greater risk-taking, in turn, creates more frequent crises and causes the central bank to extend the scope of its lending even further. Policymakers and the public see the frequency and magnitude of financial crises grow even as the willingness of the central bank to lend increases.

Gradually, under this scenario, an understanding might emerge among policymakers and the public that excessively liberal central bank lending is counterproductive. The view would be supported by economists' improved understanding of the causes of increasing risk in the financial system and its relation to excessive central bank lending. As central bankers come to feel overextended, they might be more inclined to incur the risk of short-run disruptions in financial markets by disappointing expectations and by not lending as freely as before. The central bank might backtrack on its initial attempts to disappoint lending expectations. Eventually, the public might decide that the increased financial crises were, in part, due to excessively liberal central bank lending. The public would want the central bank to become more restrictive, even at the cost of precipitating a financial disruption by refusing to lend in a particular crisis. Ultimately, with the public's support and a consistent willingness to risk the consequences, a central bank would acquire a reputation for more limited lending. Financial firms might then take on less risk, and financial market crises might become less common.

One might wonder where we are in this process today. The parallel with monetary policy is again instructive. During the 20 years of great inflation there were four major episodes (1966, 1968, 1973-74, 1979-82) in which the Federal Reserve tightened monetary policy to restrain inflation with adverse consequences for employment. It was not until the savings and loan crisis of the mid-1980s that the public became aware of the greater risk-taking engendered by the government financial safety net, e.g., deposit insurance and central bank lending. To date, there are no instances in which a financial crisis has followed a refusal by the Federal Reserve to extend emergency credit assistance. Granted, provisions of the FDICIA of 1991 impose some constraints on Federal Reserve lending to failing institutions: lending to undercapitalized depository institutions is limited, except in circumstances involving "systemic risk" (requiring high-level certification), and the Fed is exposed to minor losses. These provisions, however, hardly constrain discount window lending; for example, it appears that Fed lending to Continental Illinois in 1984 would have met the requirements of the 1991 Act.

There is little evidence yet that the general public in the United States favors a significantly more restrictive lending policy for the central bank. One might regard the Bank of England's handling of the Barings closure as an instance of a move toward a more restrictive lending policy. But the parallel with monetary policy suggests that episodes of increasing severity may be necessary before central banks definitively alter course in the direction of lending restraint.

4. CONCLUSION

We have presented some guiding principles for central bank lending. Central bank lending should be regarded as a line of credit, and should be expected to exhibit the tensions inherent in private line-of-credit products. The most serious problem is managerial moral hazard, the borrower's incentive to take on more risk after arranging a credit line. We discussed in some detail contractual provisions (loan covenants, collateral, and monitoring) designed to control moral hazard. The key point is that contractual provisions enable profit-maximizing lenders to credibly commit to withdraw credit and induce the closure or reorganization of a borrowing firm when appropriate.

The contractual mechanisms utilized by private line-of-credit providers are less effective for a central bank whose primary mission—to maintain financial system stability—can override its obligation to protect public funds and undercut its ability to limit lending. We considered in some detail five broad approaches to a central bank's commitment problem: offering good offices only, intervening early and taking collateral, adopting a strategy of constructive ambiguity, extending supervisory and regulatory reach, and building a reputation. Our analysis suggested that the first four institutional approaches cannot be

counted on to overcome the fundamental forces causing a central bank to lend.

On the other hand, we believe that it should be possible for a central bank to build a reputation for limiting its lending commitment, just as central banks around the world acquired credibility for low inflation. In fact, we view the forces operating on central bank lending policy as analogous to those influencing the path of inflation. Liberal lending policy initially raises expectations of lending. There is more frequent lending, increased moral hazard, and greater financial instability. Gradually, policymakers and the public become willing to disappoint lending expectations. The economy then experiences a temporary period of heightened financial instability associated with increasingly restrictive lending, which is followed by less financial instability and little central bank lending. It would appear that we are still at the initial stages of what could be a lengthy process.

We are agnostic about whether central bank lending is beneficial. We put off consideration of that difficult question until central bank lending is more restrained, just as the debate on the desirability of low or zero inflation in the steady state was deferred until inflation was brought down sufficiently. Currently, the critical policy question is how to reverse perceptions that central banks are increasingly willing to lend, which increases risk-taking and the likelihood that central banks will feel compelled to lend. Just as monetary policymakers looked for opportunities to disinflate, we think that financial economists and central bankers should look for opportunities to restrain central bank lending.

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