The Advantages of 'Transferable Puts' for Loans at Failed Banks

Eric S. Rosengren and Katerina Simons

Vice President and Economist, and Economist, respectively, Federal Reserve Bank of Boston. The authors thank Robert Chicoski for able research assistance.

In testimony on February 3, 1992 before the Committee on Banking, Housing, and Urban Affairs of the United States Senate, Richard F. Syron, President of the Federal Reserve Bank of Boston, proposed a mechanism to help relieve current credit availability problems by making existing FDIC guarantees of loans transferable throughout the private financial system. This article examines Mr. Syron's rationale for the proposal and how it might work.

Problems with reduced credit availability have always received widespread attention. Previous episodes resulted from the flow of deposits out of banks in response to rising market interest rates, in the face of regulatory ceilings on bank interest rate payments. The current "credit crunch" has occurred even though interest rates have been falling, rather than rising, and even though deregulation has eliminated the regulatory impediments to banks' offering market rates to depositors. Because this credit crunch is taking place in a very different economic environment, alternative explanations are needed for the conditions motivating problems in credit availability. Recent research by Bernanke and Lown (1991) and Peek and Rosengren (1992a, 1992b) has focused on the role of capital regulation. Banks with depleted capital have been forced to shrink their balance sheets, frequently by reducing loans, in order to satisfy capital-to-asset ratios enforced by regulators. This article focuses on a second mechanism reducing credit availability, namely the procedure for resolving the assets of failed banks.

The number of failed banks is much larger than in previous recessions. In 1991, 124 commercial banks were closed in the United States, compared to 42 in 1982. In some regions, and particularly in New England, the recent problems have been especially acute, with 46 failures in 1991 compared to one in 1982. Not only did the institution with the most deposits in New England fail (Bank of New England), but in New Hampshire, five of the seven largest depository institutions failed. In regions with many failed institutions, the handling of loans by

the Federal Deposit Insurance Corporation (FDIC) is a critical determinant of credit availability.

A second distinctive feature of the current problems has been the rapid growth in "performing nonperforming loans," loans current on payments of principal and interest whose collateral value has dropped below the value of the loan. In a healthy institution, the lender would have an incentive to work with the borrower so long as the lender had a reasonable expectation of receiving full payment eventually. Now, however, many of these loans are in the portfolios of failed banks whose assets are controlled by the FDIC. In just one failed bank acquisition, that of Bank of New England, $1.4 billion in performing nonperforming loans was transferred to the FDIC.

When a bank fails, the FDIC normally tries to find a bank to buy the deposits and good assets of the failed bank. Because the extent of problem assets may not be immediately clear, the FDIC normally allows the acquiring banks to return substandard loans, including performing nonperforming loans, to the FDIC for full face value during the first year after the acquisition. This "put" to the FDIC is at a discount to the full face value after the first year and normally does not exceed three years.

Once assets have been put back to the FDIC, they are normally transferred into a "bad asset" pool. The FDIC usually contracts to have these assets managed by collecting agencies, which are instructed to maximize the cash flow to the FDIC, after appropriately discounting for the time value of money for cash received in the future.[1] These management contracts provide neither the incentive nor the ability to work out loans in the way that might have been done, had the borrower had a relationship with a well-capitalized bank. As a result, too many loans are foreclosed.

This article discusses an alternative way to treat performing nonperforming loans.[2] Under this scheme, when performing nonperforming loans are placed in the equivalent of "bad banks" by the FDIC, the borrower could transfer the loan to any willing financial institution, bringing along the same government guarantee on the loan that is currently extended to acquirers of failed banks—in effect, making the put transferable. The resulting competition for "puttable" failed bank assets would provide a market for performing nonperforming loans that would reduce the number of liquidated loans and potentially reduce costs to the FDIC.

The next section of the article discusses how a drop in the liquidity of assets serving as collateral for bank loans will cause an increase in performing nonperforming loans. The second section discusses FDIC procedures for managing failed bank assets. The third section shows why the current resolution of failed banks may not be an optimal contract. The fourth section shows how transferable puts could improve the disposition of failed bank assets, and the final section offers conclusions and recommendations.

I. Performing Nonperforming Loans

Banks have always specialized in evaluating businesses with little publicly available information. Their expertise in assessing risks of small and mid-sized businesses and valuing illiquid assets distinguishes banks from most other financial intermediaries. (See, for example, Gertler and Gilchrist 1991.) Analysis done by banks frequently involves much more monitoring than is commonly done by pension funds and insurance companies, which hold a higher percentage of assets in marketable securities for which they are passive investors.

For intermediaries such as broker-dealers, valuing assets is straightforward. In the highly liquid market for Treasury and agency securities, for example, the large volume of transactions for these assets allows large positions to be sold or bought without materially altering the price of the asset. The same is not true for most collateral for bank loans. Frequently, the loan collateral is highly specialized structures or equipment that, if sold, will receive a price close to the replacement value only after a substantial search for potential buyers. If forced sales occur, the asset would sell for liquidation value, which could be significantly below the price that would be achieved if the seller had time to actively search for a buyer interested in the specialized asset. The difference in valuation of liquid and illiquid assets (with no inflation) is illustrated in Figure 1. The valuation of a

---

[1] The FDIC would prefer to receive its money now rather than in the future. Money received now can be invested to receive a flow of income. Thus, to make money received in the future equivalent to money received now, the future payments must be discounted by the opportunity cost of the funds.

[2] This proposal was discussed with the FDIC in November 1991. As of this writing, the FDIC is considering the adoption of transferable puts both in its agreement with Fleet/Norstar Financial Group for the management of the assets of the failed Bank of New England and in future failed bank resolutions.

Figure 1

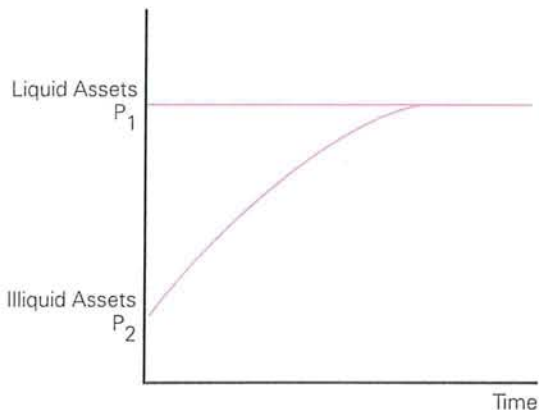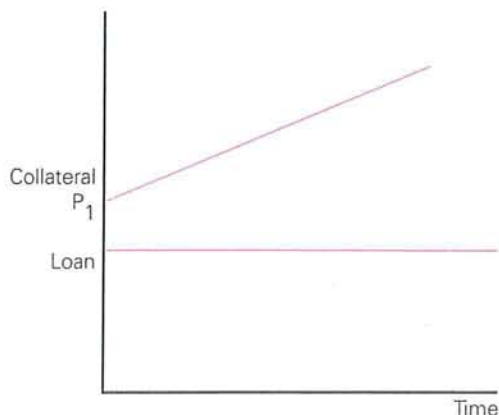*Valuation over Time of Liquid and Illiquid Assets, with No Inflation*

Figure 2

Valuation over Time of Loan Amount and Its Collateral, with Inflation

performing nonperforming loans requires considering several additional factors.

The first factor is inflation. With inflation, the nominal price of the collateral increases at every point in time. Of course, other aspects of the loan, such as the real value of the earnings, may be adversely affected by inflation. In particular, unexpected increases in inflation will decrease the value of a fixed-rate loan to the lender. Since loan contracts agree to pay a fixed nominal amount at a future date, the value of collateral during periods of high inflation will quickly surpass the loan amount. This is shown in Figure 2. The valuation line for the principal of the loan is horizontal (or declining if the loan balance is amortized), while the valuation line for collateral increases at the rate of inflation. Thus, if a business cannot make the cash flow payments on a loan, and the lender intercedes quickly, the lender can be protected from loss by selling the collateral. The rate of inflation, however, has dropped sharply in the last three years. Without inflation, the valuation line for the collateral is not upward-sloping, so that an asset repossessed by a lender may only partially pay off the loan if it is sold quickly.

The second factor is the decreased demand for real estate. Since many loans are backed by real estate, a decrease in the demand for real estate will result in a decline in nominal real estate prices. This has occurred in New England, where real estate prices have declined sharply from their 1987 peak.[3] A shift in demand would be represented in Figure 1 as a parallel shift downward of both the valuation lines.

A third factor in the increase in performing nonperforming loans has been decreased liquidity, which would be represented in Figure 1 as a decrease in the initial value of P_2. A drop in liquidity indicates that while the long-run valuation of an asset would be unchanged, the value realized on a short-notice sale would decrease. In New England, liquidity may have decreased as a result of the sharp increases in

liquid asset would be unaffected by time, as illustrated by the horizontal line at P_1, the price of the liquid asset. An illiquid asset would sell at P_2 if it had to be sold immediately, but with enough time would fetch a price of P_1, its long-term value.

While asset values for illiquid assets are a function of time, illiquid assets have always served as collateral for bank loans. Why have performing nonperforming loans become so critical to banks recently? To understand the sudden emergence of

[3] In New England, total sales of existing homes fell from 235.5 thousand to 174.7 thousand between the second quarter of 1988 and the third quarter of 1991, a drop of nearly 26 percent. In the same period, the median sale price for existing single-family homes in Hartford fell from $169 thousand to $149.4 thousand, a drop of 11 percent and in Boston fell from $182.9 thousand to $175.5 thousand, a drop of 4 percent. (Source: National Association of Realtors.) These changes in home sale prices are subject to the usual caveats: they understate the depth of the real estate slump because they do not reflect the value of home improvements made by the seller, and they exclude all the properties taken off the market by the sellers because the offers made were too low. (See, for example, Case and Shiller 1987.)

the numbers of personal and business bankruptcies,[4] the large number of failed financial institutions whose assets had to be sold, and a tightening of credit conditions at banks that forced many businesses to sell assets.

A final factor is the appraisal process. Under normal economic conditions most assets will be sold at close to their long-run value. As a result, appraisals, which are based primarily on sales of comparable properties, will value assets at their long-run value. During periods of decreased demand and liquidity, however, many sales will be involuntary. These distress sales will often be at the spot price, so that substantial discounts from the long-run price become the reported sales prices. If so, appraisals based on comparable property increasingly will reflect the liquidation price rather than the long-run value of the assets. These appraisals based on liquidation prices are then incorporated into the valuation of bank assets during the examination process. Thus, even without a change in the long-run price of an asset, an increase in distress sales can cause a rise in performing nonperforming loans due to the appraisal process.

New England banks experienced all the factors conducive to a rapid increase in performing nonperforming loans during the early 1990s. The inflation rate was low and the major collateral for bank assets, real estate, experienced a decrease in demand. In addition, bank failures, tighter credit conditions induced by inadequate bank capital, and increased numbers of bankruptcies all contributed to a sharp reduction in real estate transactions, which caused a drop in liquidity. The appraisal process further exacerbated the problem by evaluating collateral based on comparable sales at current prices rather than long-run values.

II. FDIC Treatment of Performing Nonperforming Loans in Failed Bank Resolutions

When collateral is appraised at an amount below the value of a loan, the loan would commonly be classified as substandard by bank examiners and it would become a performing nonperforming loan. If a large number of loans are in this category, the bank would likely increase its provision for loan loss reserves, thus depressing its earnings. If the bank believes, however, that appraisals are artificially low because of a depressed market and that the borrower

will continue to make payments on the loan, the bank would have little incentive to incur the costs of foreclosure and a distress sale of the collateral. The same is not necessarily true if the performing nonperforming loan is in a bank acquired by the FDIC.

In the case of most bank failures, the FDIC agrees to repurchase the bad assets of the failed bank. This "bad bank" is then operated by an agent of the FDIC, which frequently is also the acquirer of the failed bank. While the details can vary somewhat, the following features are typical of these agreements:[5]

1. After a loan acquired from the failed bank is classified by the acquirer,[6] the acquirer has up to 90 days to put the loan back to the government to be managed as part of the pool of bad assets.
2. If the loan is classified and put back in the first year, the acquirer is paid the full face value of the loan. In the second year, the acquirer is paid 98 percent of the face value, and in the third year, 96 percent. At the end of three years, no additional loans can be put back to the government.
3. If the acquiring bank materially alters a loan by restructuring the terms, it loses the put on the loan.
4. If the acquiring bank takes back a loan it had sent to the classified loan pool, the loan cannot be put back to the government a second time.
5. Under the terms of a servicing contract, the FDIC pays a collecting agent for the pool of classified loans for all costs incurred in collection on loans plus a monthly incentive fee based on collections up to that time.
6. The collecting agent is instructed to maximize the cash flow to the FDIC appropriately discounted for the time value of money.

---

[4] In the past two years the number of bankruptcy filings in Massachusetts more than tripled, increasing from 4,229 in 1989 to 12,942 in 1991. (Source: Administrative Office of the U.S. Courts. Figures are for years ending June 30.)

[5] The Purchase and Assumption Agreements with both Fleet Financial Group for the purchase of Bank of New England and Key Bank of Western New York for the purchase of Goldome had these features. The length of the put option may vary. In the agreement with Chase Bank of Connecticut for the purchase of Citytrust, for instance, the put is for two years, instead of three. The structure of the incentive fee, however, is the same.

[6] Examiners classify problem loans into four categories listed in the order of credit risk to the bank: other assets especially mentioned (OAEM), substandard assets, doubtful assets, and loss assets. Only assets classified as substandard or below can be returned to the FDIC. These are all assets that examiners believe have a distinct possibility of sustaining some loss for the bank.

7. The collecting agent has limitations on its ability to restructure or alter the terms of the original loans.

The acquiring bank has a clear incentive to quickly identify problem loans and transfer them to the FDIC. Failed bank loans held by the acquirer that are classified after the first year receive less than the full face value. Once classified, if the loan is not put back to the FDIC in 90 days, the acquiring bank loses the put. After the loan has been transferred to the FDIC, the collecting agency for the classified asset

---

The bank acquiring a failed bank has a clear incentive to quickly identify problem loans and transfer them to the FDIC.

---

pool has incentives to collect the entire loan quickly. While the collection agency may even be a nonbank subsidiary of a bank holding company, it is not structured to maintain a lending relationship with customers, so it has no incentive to restructure the loan. Moreover, the servicing contract explicitly limits the amount of additional funds that can be expended to support a loan.

In many cases, the acquirer of the failed bank and the collecting agent are subsidiaries of the same bank holding company. While the servicing contract is a device to entice bidders to acquire the failed bank, it also creates serious incentive problems. The acquirer can maximize incentive fees by aggressively classifying as substandard the loans it is not anxious to keep. Since the fee schedule is based on cumulative collections, putting back to the FDIC loans that are only slightly impaired and then making a quick collection through the servicing agent provides a fee for eliminating marginally profitable loans while ensuring that more difficult collections are compensated at the higher fee schedule.

III. Contractual Incentives

The servicing agreement has two components. The first is the incentive the acquiring bank has to put the failed bank assets into the bad loan pool. The second is the incentive the collecting agency has to foreclose once the loans are in the bad loan pool.

The Put

The acquiring bank has a limited time to put assets of the failed bank back to the government. Only loans that would be classified as problem loans by a bank examiner can be put back to the FDIC. If the bank retains a classified asset, it must reserve more capital for its possible default. If a loan is put back to the government, the acquiring bank receives cash for the face value of the loan, and can use this cash to make a new loan. Since a new loan will initially have a lower probability of default and will require less capital to be set aside for possible loan losses, the acquiring bank will prefer to place all classified assets in the bad loan pool.

The Collecting Agency

The servicing agreement with the collection agency is straightforward. The FDIC reimburses the agency for all collection expenses. In addition, the agency receives an incentive fee based on the amounts it collects. The fee is on a graduated scale based on net cumulative collections (collections minus double the collection expenses), and it ranges from 1.5 percent of the first 20 percent of such collections to 27.5 percent of collections over 50 percent. Furthermore, the incentive fee is capped at 5 percent of gross collections, that is, collections before expenses are subtracted.[7]

---

[7] The incentive structure is as follows:

Collections as a Percentage of Gross Pool Value	Cumulative Net Incentive Fee as a Percentage of the Cumulative Net Collection Strata (from the first column)
less than or equal to 0%	0
over 0% to and including 20%	1.5
over 20% to and including 31%	4.0
over 31% to and including 39%	7.5
over 39% to and including 46%	11.0
over 46% to and including 50%	18.5
over 50%	27.5

The fee received by the collection agency is:

$$FEE = \min[\gamma\min(L, P_t); \lambda(\min(L, (P_t - 2F - 2M)))]$$

where P_t is the value of the collateral, L is the face value of the loan, γ is the maximum incentive fee, λ is the graduated incentive rate, F is the cost of foreclosure, and M is the cost of monitoring the loan. The complete mathematical derivations of the contract and the incentives of the acquiring bank, the collecting agency and the FDIC are available in the Appendix to this article.

Within this incentive structure, the collection agency must first decide whether to foreclose on a loan and sell the collateral or give the borrower time to pay off the loan. If the agency decides to foreclose, it must then choose the optimal time of foreclosure.

The agency will foreclose when the reinvested money from foreclosing on collateral exceeds the value of the loan. If the agency has reached the maximum incentive fee, the collecting agency bears no foreclosure cost on additional foreclosures. Therefore, the agency determines the benefits of foreclosure as the money received from the foreclosure, ignoring all costs associated with the foreclosure,

---

The collecting agency will foreclose when the reinvested money from foreclosing on collateral exceeds the value of the loan.

---

reinvested at the rate of return the collecting agency receives on its investments.

The FDIC would also choose to foreclose when the reinvested money from foreclosing on collateral exceeds the value of the loan. However, the FDIC's decision differs from that of the collecting agency in two ways. First, the FDIC must bear the costs of foreclosure, so the money available from foreclosure to reinvest is net of all costs of foreclosure. Second, the FDIC's rate of return is the government borrowing rate, which will be below the borrowing rate of a private company. Thus, the collecting agency is most likely to foreclose on a loan when the FDIC would not if the monitoring and foreclosure costs are large and the government's borrowing rate is substantially lower than the collecting agency's internal rate of return.

In addition, for those loans where both the collecting agency and the FDIC will find it optimal to foreclose at some point, the collecting agency will foreclose sooner. Both the FDIC and the collecting agency would choose to foreclose when the additional revenue gained from collateral appreciation is less than the revenue gained by foreclosing and reinvesting the funds. However, because the FDIC has a lower rate of return for reinvested funds, and because it must bear the costs of foreclosure, its

opportunity cost of waiting for further asset appreciation is lower than that of the collecting agency. The argument is strongest when the collecting agency has reached the maximum incentive fee of 5 percent of net cumulative collections and its marginal cost of an additional foreclosure is zero. But it still holds in the less extreme cases since, under the current contract, the collecting agency never bears the full costs of monitoring and foreclosure on collateral. Therefore, loans that would be fully paid off with additional time may be foreclosed on, since the servicer prefers to receive the incentive fee immediately rather than wait for a small additional appreciation in the asset. For example, the foreclosure cost might far exceed the discount of selling at the liquidation price, but the servicer would still prefer to foreclose as long as its share of the foreclosure cost was less than the appreciated value of the asset.

This servicing contract ignores all externalities from foreclosing prematurely on a viable business. A bank that restructures a loan can receive profits from the loan in the future. The collecting agency receives no benefits from maintaining a viable business, since it will not be extending credit to the business in the future. In addition, the costs to society of unemployed labor and capital are ignored in the servicing contract.

The incentives for the current contract are most perverse for performing nonperforming loans. Since they have only slight impairment of collateral value, the collecting agency gains little from waiting and gets close to the full potential incentive fee by collecting quickly. By collecting on many only slightly impaired loans, the collecting agent also ensures that it gets the maximum incentive fee of 5 percent. Thus, for the least impaired loans the servicer has an incentive to liquidate the collateral, even though the servicer might achieve lower costs if a longer horizon were chosen. The incentives are less perverse in cases where the loan is nonperforming and the collateral could never pay off the loan. For extremely troubled loans, taking possession of the collateral may be necessary in order to prevent further deterioration of the FDIC's position. In such cases, maximizing the value of the asset can be achieved only by removing the current owners through the foreclosure process. The transferable put would do little in cases where foreclosure is the optimal strategy, but would be a substantial improvement for those least impaired loans, where the incentives of the collecting agent diverge the most from the incentives that would exist if the loan had been issued by a well-capitalized bank.

IV. The Transferable Put

The transferable put alters the current FDIC agreements in two significant ways. First, it eliminates the current 90-day expiration of the put option once a loan is classified, and it allows the acquiring bank to take assets back again from the FDIC without extinguishing the put. This provides the acquiring bank more time to determine if a loan will return to performing status and leaves the loan in the banking system rather than with a collection agency. Second, it allows the put to be transferred. Therefore, the borrower could transfer the government guarantee on a loan from a failed bank to any financial institution willing to extend credit. If the lender acquires a loan with a full government guarantee the first year, its risk-based capital ratio would be unchanged. (Actual regulatory treatment is discussed below.) In subsequent years, only the portion of the loan not guaranteed by the government would be included in the calculation of the risk-based capital ratio.

This proposal could be less costly than the standard contract used by the FDIC.[8] First, fewer performing nonperforming loans would be transferred to the asset pool serviced by the collection agency. Because the acquiring bank would no longer need to transfer loans within 90 days after being classified, it would keep a higher percentage of loans in the bank in the hope that they could be restored to fully performing status. For the loans that are transferred to the collecting agency, the borrowers have a strong

---

The proposed transferable put could be less costly than the standard contract used by the FDIC.

---

incentive to seek out lenders willing to work out the loan. If a substantial number of loans are retained by the private banking system instead of being transferred to the collecting agency, the FDIC would save the incentive fee and the expenses paid to collect and manage the asset pool.

A second advantage is that this proposal eliminates some of the conflicting incentives that occur when the acquiring bank and the collecting agency are part of the same holding company. In such cases,

the holding company has an incentive to classify marginal loans that have a high probability of making a complete payoff. After transfer of a loan to the collection agency, the monitoring and collecting costs are paid, the maximum servicing fee based on cumulative collection is more easily achieved, the incentive fee is paid, and the bank eliminates all default risk. With alternative bidders for these loans, acquiring banks may be more aggressive in ascertaining each borrower's prospects, since they may be losing a potential good customer to a competitor and will not receive any of the incentive fees. In addition, it is precisely those loans with the highest ratio of collateral value to the amount of the loan that will be most attractive to other banks. Such loans are most likely to be paid in full, because the collateral value would soon reach the face value of the loan. Thus, it is the strongest borrowers who would avoid foreclosure with transferable puts and would benefit the most from this proposal.

A third advantage is that loans that would have been worked out, had they been in a well-capitalized institution, can be transferred to such institutions with the help of the government guarantee. Currently borrowers in the collecting agency have no alternatives, since no other bank will be interested in extending credit to a borrower whose loan has been classified and whose assets could be encumbered at any time by a foreclosure filing. With a transferable put, those loans with good prospects for making full payment will not be prematurely foreclosed as a result of the incentives of the collection agency. The FDIC also acquires market information on the prospects of the individual loans that do not remain in the banking system. If no bank can be convinced to acquire the loan with the government guarantee, action based on the incentives of the collection agency may be the most appropriate way of disposing of the loan.

This analysis has assumed no uncertainty about the future price of the collateral. In reality banks are uncertain about whether low asset sales prices reflect a lack of liquidity, which leaves the long-run price unaffected, or a drop in the demand for the asset, which causes the long-run price to decrease. When uncertainty is great, transferable puts allow banks that believe that the long-run price will be unaffected to work out performing nonperforming loans that would otherwise be left to the collecting agency.

---

[8] This is true assuming that the long-run asset value stays constant. If the FDIC expects a large drop in asset values, it may be optimal to foreclose and sell everything as soon as possible.

V. Conclusions and Recommendations

Borrowers whose collateral value has dropped and whose bank has failed have been the source of substantial credit complaints, particularly in New England where the numbers of failed banks and performing nonperforming loans have been high. Borrowers whose loan payments are current but whose collateral is impaired would normally be able to work with their bank. However, when the bank fails, these loans have been placed with collecting agencies that have a strong incentive to liquidate. These incentives may cause premature foreclosures that cost the FDIC money, result in a liquidation not in the borrower's interest, and create unemployment and unused capital. These problems could be reduced by allowing the government put on performing nonperforming loans to be transferable. Adoption of such a proposal could result in fewer liquidations, which would be in the interests of both the FDIC and the borrower.

How extensively banks would lend to borrowers with transferable puts is uncertain. It would depend, at least in part, on the regulatory treatment of these loans under the risk-based capital standards. If the puts were treated as government securities they would receive a risk weighting of zero; however, if they were treated as agency securities they would receive a risk weighting of 20 percent. Given the shortage of capital at many New England institutions, a risk weighting of 20 percent could discourage some lenders. In addition, many institutions are shrinking and may not want to acquire loans that require substantial monitoring. Nonetheless, for borrowers with transferable puts able to find a willing lender, their risk of liquidation may be significantly reduced.

Appendix

This appendix provides a more formal mathematical treatment of the argument outlined in this paper. Equation (1) is an example of the valuation of an illiquid asset.

$$(1) \qquad P_t = P^{LR} - \alpha_1 t^{-1}$$

The price received for an illiquid asset is a function of time. If the asset must be sold immediately, the price is the long-run price, P^{LR}, minus α_1. For illiquid assets with little or no value except to a few potential buyers, α_1 will be large relative to the long-run value. For a perfectly liquid asset, such as a Treasury security, α_1 would be 0 and the price at all times would equal the long-run value. The explicit functional form is used in Equation (1) for ease of exposition, although any functional form that resulted in the collateral selling at a discounted price initially, with the price eventually converging to the long-run value of the asset, would be equally suitable.

To understand the sudden emergence of performing nonperforming loans, simple alterations to Equation (1) are required.

$$(2) \qquad P_t = P^{LR} * \pi_t - \alpha_1 t^{-1} + \alpha_2$$

The first addition is π, the change in prices through time t due to inflation. The second addition is α_2, which represents a shift in the demand for the asset used as collateral, for reasons outlined in the paper.

The fee the collection agency receives from the FDIC is summarized in Equation (3):

$$(3)$$

$$FEE = \min \left[\gamma \min (L, P_t); \ \lambda (\min (L, (P_t - 2F - 2M))) \right]$$

where P_t is the value of the collateral, L is the face value of the loan, γ is the maximum incentive fee (in this case 5 percent), λ is the graduated incentive rate, F is the cost of foreclosure and M is the cost of monitoring the loan.

Equation (4) summarizes the decision whether or not to foreclose at all, from the collecting agency's perspective. For simplicity, we assume here that the agency has reached the maximum incentive fee, γ, and bears no foreclosure costs on the margin:

$$(4) \qquad P_t e^{(\theta - t) r_1} > P_\theta = L$$

The left-hand side of Equation (4) represents the value of the foreclosed collateral reinvested at the agency's internal rate of return r_1 for a time period $\theta - t$, where θ is the point in time when the asset value reaches the value of the loan, L. The agency will choose foreclosure as long as reinvested money from foreclosed collateral exceeds the value of the loan.

In contrast, the FDIC's decision on foreclosure is represented by Equation (5).

$$(5) \qquad (P_t - F - M) e^{(\theta - t) r_2} > P_\theta = L$$

where F and M are foreclosure and monitoring costs, respectively, and r_2 is the government borrowing rate. Equation (6) provides the condition under which the col-

lecting agency would foreclose on a loan and the FDIC would not.

$$(6) \qquad P_t e^{(\theta - t)r_1} > L > (P_t - F - M)\, e^{(\theta - t)r_2}$$

Equation (7) represents the first-order condition for the optimal timing of foreclosure for the collecting agency:[9]

$$(7) \qquad \gamma \frac{dP_t}{dt} = \gamma r_1 P_t$$

The left-hand side of Equation (7) is the additional revenue gained from the collateral appreciation, and the right-hand side is the opportunity cost of waiting given the internal rate of return r_1. If we substitute the explicit valuation function from Equation (1) into Equation (7), we get the equilibrium for determining when to foreclose, again assuming the maximum incentive fee has been reached:

$$(8) \qquad \frac{\alpha_1}{t^2} = r_1 \left(P^{LR} - \frac{\alpha_1}{t} \right)$$

Equation (8) illustrates why so many borrowers whose loans have been classified as performing nonperforming complain of almost immediate threats of foreclosure. Whenever the right-hand side of Equation (8) is greater than the left, foreclosure is optimal for the collection agency.

Equation (9) shows the first-order condition for foreclosure from the point of view of the FDIC:

$$(9) \qquad \frac{\alpha_1}{t^2} = r_2 \left(\left(P^{LR} - \frac{\alpha_1}{t} \right) - F - M \right)$$

It differs from Equation (8) by the presence of the monitoring and foreclosure costs paid by the FDIC and the different interest rate. A similar result holds but with somewhat less

disparity when, on the margin, the collecting agency bears some cost of foreclosure. Suppose that on a particular property, the collection agency pays a portion of the foreclosure cost, aF, with the FDIC paying $(1 - a)F$. Then, from Equation (7), the collecting agency's decision rule is:

$$(10) \qquad \frac{dP_t}{dt} = r_1\,(P_t - 2aF)$$

while the FDIC's decision rule is:

$$(11) \qquad \frac{dP_t}{dt} = r_2\,(P_t - (1 - a)\,F)$$

It would be in the interest of the collecting agency, but not of the FDIC, to foreclose whenever

$$(12) \qquad r_1\,(P_t - 2aF) > r_2\,(P_t - (1 - a)F)$$

One exception to this rule would occur if the FDIC and the collecting agency had the same discount rate, that is, $r_1 = r_2$, and the marginal incentive rate of 27.5% were in effect. Assuming that the monitoring cost is zero, if $r_1 = r_2$, then the above inequality would not hold whenever a, the proportion of the foreclosure cost borne by the collection agency, was greater than one-third. This is precisely the case when the incentive rate is 27.5%, making the proportion of the foreclosure cost borne by the agency equal to $27\% * 2 = 55\%$. Note that this does not occur at any of the lower marginal incentive rates.

---

[9] The left-hand side of Equation (7) would have an additional term if the collecting agency fell short of the maximum incentive rate for the marginal loan, because each collection brings it closer to the maximum rate. This complicates the model without altering the general conclusions.

References

Bernanke, Ben, and Cara Lown. 1991. "The Credit Crunch." *Brookings Papers on Economic Activity.* Forthcoming 1992.

Case, Karl E. and Robert J. Shiller. 1987. "Prices of Single-Family Homes since 1970: New Indexes for Four Cities." *New England Economic Review,* September/October, pp. 44–56.

Gertler, Mark and Simon Gilchrist. 1991. "Monetary Policy, Business Cycles and the Behavior of Small Manufacturing Firms." Board of Governors of the Federal Reserve System.

Peek, Joe and Eric S. Rosengren. 1992a. "The Capital Crunch: Neither a Borrower Nor a Lender Be." Federal Reserve Bank of Boston.

Peek, Joe and Eric S. Rosengren. 1992b. "The Role of Real Estate in the New England Credit Crunch." Federal Reserve Bank of Boston Working Paper Series No. 92-4.

Syron, Richard F. 1992. Testimony before the Committee on Banking, Housing, and Urban Affairs, United States Senate. February 3.